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ELECTRICAL REVIEW

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Vol. CXXXIII. No. 3441 NOVEMBER 5, 1943 6d. WEEKLY

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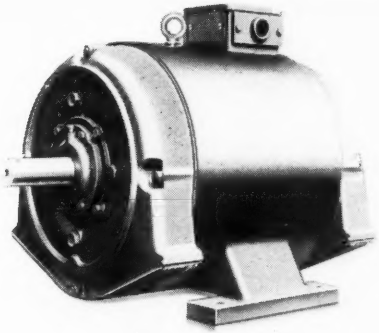

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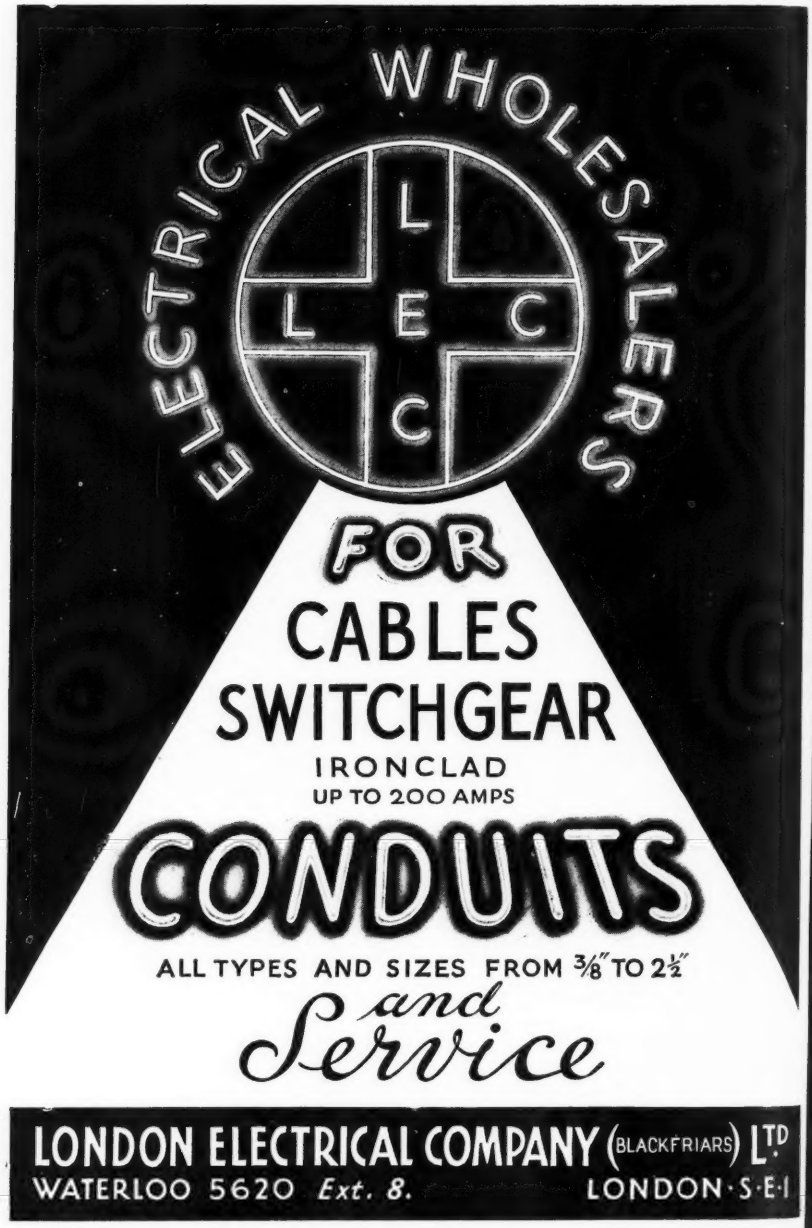
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ELECTRICAL REVIEW

November 5, 1943

Managing Editor:
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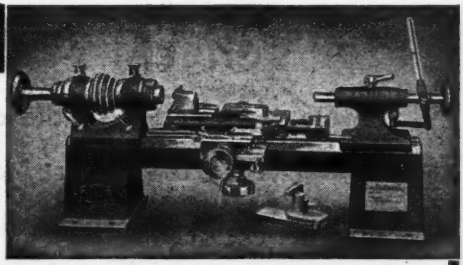

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ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXXIII. No. 3441. NOVEMBER 5, 1943 6d. WEEKLY

Plug Problems

Suggestions for New Standards

THERE is at present no standard 10-A plug for domestic installations —nothing between 5 A and 15 A. The latter is thought by many to be unnecessarily large for average requirements: the former has proved its worth for general use and has often borne more than its rated burden. This fact has prompted some makers of 5-A plugs to affirm that if such a plug (with its socket outlet) is made in conformity with the British Standard Specification (No. 546) it is quite capable of carrying 10 A without overheating or risk of breakdown.

Fused or Flat?

But there are two bodies of opinion which consider it time that a standard specification for a 10-A plug was available. They differ radically in their ideas of what is needed. One party, of which Major R. Amberton is a spokesman, is in favour of retaining the round pin design. In addition he proposes to kill another bird with the same stone by substituting a fuse for one of the pins. He explained his idea in an article in last week's issue stating that a major reason for fusing the plug is to enable the ring-main principle, which it is hoped to incorporate in future homes, to operate satisfactorily. That is, to ensure that trouble at one plug point does not put the whole circuit out of action.

He dismisses, rather summarily perhaps, any suggestion that there will be difficulties in the manufacture of these plugs—or rather that present manufacturing arrangements will be upset. But that is not the impression we have gained from a representative of one of the manufacturers, although he was concerned principally with the proposals of the other 10-A plug advocates—those who wish to see a standard flat-pin model.

This ancient controversy of round *versus* flat pins has recently been resuscitated by the I.M.E.A. which has proposed that the B.S.I. shall produce a specification for a 10-A flat-pin plug. Mr. T. C. Gilbert also champions the flat pin in this issue. Apparently the prospect of four million new houses is regarded as providing an opportunity for a large-scale introduction of the flat pin, but all these houses will not be in one district so that manufacturers, wholesalers, supply authorities and contractors would have to carry stocks of both types and the desirable interchangeability would be frustrated. There might thus be a reversion to the conditions which existed before the production of the original specification (No. 372).

A Question of Demand

If there existed a real demand for flat-pin plugs it would be a duty of the manufacturers as a whole to satisfy it. The argument that their works would be badly dislocated during the period of change-over or adaptation is not a good one if it stands in the way of progress. But it is very necessary to be sure that any drastic change does represent progress and is not merely another way of securing similar, not substantially better, results.

It must also be established that a demand exists. In this country most people are not aware that there are such things as flat-pin plugs, for the vast majority of makers have concentrated on the round-pin type of which many millions have been installed. Presumably the B.S.I. will have this in mind. Of course if a new specification is produced, whether for a flat-pin plug, a fused round-pin pattern or even, as has been further suggested, a fused socket outlet, it does not follow that it will create a demand of such magnitude that manufacturers will be compelled to turn over immediately to the production of the new standard.

The Gas Report

INTEGRATION, not nationalisation, is the key-note of the British Gas Federation's report to the Ministry of Fuel and Power on the planning of the gas industry. The report is a comprehensive and well-thought-out document. It presents a good case for evolutionary planning, but a better one for the gas industry as against its chief competitor. The ability to store gas for meeting peak loads is emphasised but it is admitted that this advantage is somewhat offset by the fact that for long-distance transmission gas cannot compete with electricity. It may truly be said that this is a "claim-staking" document possessing the advantage of having been prepared by a united industry, or the great majority of its members. Those concerned with the future of electricity supply should give it the closest study.

Institution Examinations

SYMBOLIC of the fundamental unity of engineering in all its branches is the decision of the Institutions of Electrical and Civil Engineers (and it is hoped that it will be of the Mechanicals also) to adopt a common first part for their examinations for associate membership. The new "Joint Section A" examination, which is to take effect two years hence, will not differ materially from the present Part I of the I.E.E., except that mathematics will be treated separately. The opportunity has been taken to make a desirable modification in Part II (to be known as "Section B") by including a paper on general electrical engineering in addition to the special subject selected by the candidate.

Dew-point Temperatures

PUBLICATION of interim reports of investigations are often helpful. This was illustrated by the paper presented last night by Mr. W. F. Harlow at the meeting of the Institutions of Electrical and Mechnical Engineers. He cleared superheaters from suspicion of playing any appreciable part, through steam leaks, in causing corrosion in flues of modern stoker-fired boilers. The facile conversion of SO_2 into SO_3, giving rise to high dew-point temperatures, he finds can only be accounted for by the high temperature of the superheater tubes, provided iron oxide is present as a catalyst. This furnishes a basis for further investigations into the efficacy of masking the catalyst or, alternatively, into suitable alloys for tube metal.

Economisers

ON the other hand, the dew-point theory is regarded by Messrs. J. R. Rylands and J. R. Jenkinson, in another paper read at the joint meeting, as inadequate to explain the occurrence of hard bonded deposits on economiser tubes. Here the catalyst appears to be ferric sulphate, and the formation of aluminium sulphate on a preliminary skin of sulphuric acid follows where (as in modern power stations) the tubes reach a temperature at which the requisite degree of acid concentration takes place. While the bearing on design of these conclusions is of great importance, their relevance to operation of existing plants, especially at the present time, is at least of equal moment.

Important Housing Plan

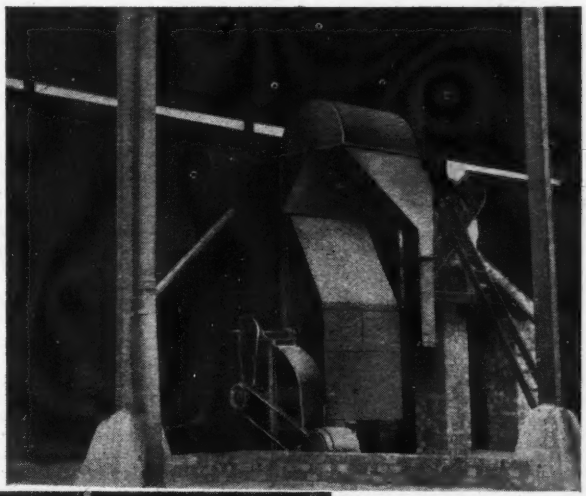
THE decision of the London County Council to proceed with the preliminary work for the construction of 2,776 houses on the Grange Hill, Essex, site is one of the first practical steps taken to meet the housing shortage. The Council's record in housing matters is a guarantee that no time will be lost in getting on with the work immediately conditions permit. In a total expenditure of £1,600,000 there should be full provision for adequate electrical services, and it is to be hoped that the electrical industry will be fully alive to the possibilities of this scheme and others which will come along soon.

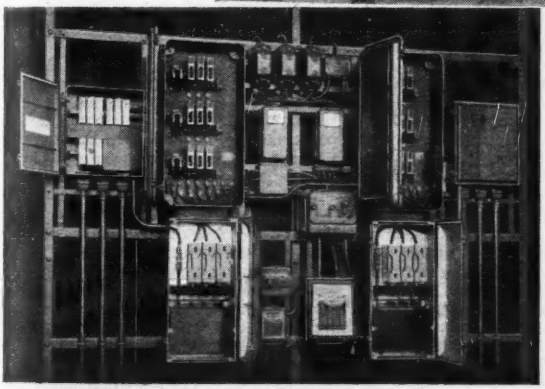
Grain Drying

A Promising New Application for Electricity

FARMERS who employ the combine harvesters recently introduced into this country have been faced with an awkward problem. Although these machines, by cutting and threshing the corn in one operation, save a great amount of labour and waste through the elimination of stooking, stacking, thatching, cartage and handling, the cutting-out of the stooking process usually leaves the grain (in our climate) in a moist condition, which may, even in so short a period as a day, cause "heating up" and consequent deterioration. Overheating quickly kills the germination in the grain which, in the case of barley, renders it useless to the maltsters.

Some means of artificially drying the grain therefore becomes essential. Several coke-fired dryers have already made their appearance on the market, but although achieving their object with a certain degree of success, leave a good deal to be desired on the score of accurate control, constancy and evenness of temperature, fumes and cleanliness. Appreciating these disadvantages of the coke-fired device, Mr. F. R. Allingham, of Old Rowney Farm, Southhill, Bedfordshire, approached Mr. P. G. Campling, the chief engineer and general manager of the Bedford Electricity Department, to ascertain the practicability of employing electrical methods. The fostering of new agricultural applications of electricity has been a feature of the undertaking's policy ever since the establishment there in 1930 of the Electricity Commissioners' rural experimental area, the financial assistance for which, incidentally, has recently been liquidated by the Town Council. The outcome was that Mr. Allingham purchased a Kennedy & Kempe coke-fired dryer and asked the Department to convert it to electric heating.

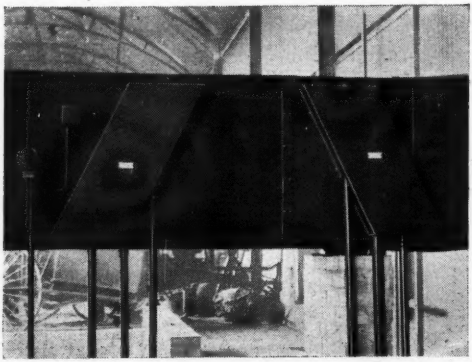




A general view of the electrically heated drying plant and (left) the main switchboard showing switches, contactors, fusegear, etc.

The process consists of blowing hot air through the grain at a predetermined temperature and speed. The dryer itself is

extremely simple, and apart from the fan has only one moving part. The fan, driven through a V-belt by a 20-HP Laurence Scott squirrel-cage motor running at 1,350 RPM and controlled by an Allen West star-delta starter, delivers 6,800 cu. ft. of air a minute. A system of ducting is arranged not only to dry the grain, but also to blow it out of the main pit into the receiving compartment at the top of the dryer. This arrangement has the additional advantage that the grain is partly warmed before it enters the dryer and is not subjected to a sudden heat. The rate at which the grain is admitted to the dryer is controlled by a regulator in the trunking leading from the base of the pit. The dried grain is discharged from the bottom of the machine *via* a slowly moving riddle connected through gearing with the fan motor.



A portion of the air duct showing the thermostatic control knob and the removable plates giving access to the wiring connections to the elements

A good deal of the dust, etc., in the grain is removed during the course of drying, but to complete the process a Boby "Superclean" dressing plant has been added. This is driven by a 5-HP, 1,000-RPM Laurence Scott motor controlled by means of a direct-on starter (Allen West) with push-buttons at both the main switchboard and a remote control point adjacent to the dresser.

Two main points had to be borne in mind in the design of the heating equipment—the wide variation of the moisture content of the grain and also of the ambient temperature. To get the best results, a comprehensive system of control over a wide range of temperatures was required.

The scheme eventually adopted comprised a primary heating unit consisting of three banks of elements loaded at 33 kW each and a secondary unit having three banks of 24-kW elements, the total load thus being 171 kW spread over the three phases of a 400-V supply. The elements, which are constructed of nichrome wire on a framework of insulating material, have been specially constructed by Unity Heaters, Ltd. Each unit has its three banks of elements arranged horizontally, one above the other, so as to cover completely the whole area of the 2ft. 6in. by 2ft. 9in. air inlet duct. The incoming air passing first through the primary bank has its temperature raised to about 107 deg. F., and each of the three banks of the secondary unit is designed to add a further 11 deg. F., a maximum temperature of about 140 deg. F. being thus achieved, with an ambient air temperature of 60 deg. F.

The primary unit, each group of which is controlled by a 50-A triple-pole Igranic contactor actuated *via* a 5-A manually operated switch, provides the basic load, while the three secondary banks of elements, which are controlled by thermostats set at 5 deg. F. intervals to give a cascade effect, are intended to take care of varying ambient temperatures. The temperature settings being interrelated, the three-step thermostat (Robert Maclaren & Co.), which is 18 in. long and fitted horizontally in the centre of the duct, is arranged for control by a single knob. An additional safety thermostat comes into operation in the unlikely event of the normal thermostats failing to function. A further safety interlocking device makes it impossible to switch on the heating elements before the fan motor. One special advantage of electric heating not previously mentioned is that it is possible to start it up without a moment's delay, there being no necessity to wait for heating-up as with coke.

Operational Results

As the past summer has been abnormally dry it is impossible to give a fair account of the operational results likely to be obtained over a period of years. This year it has been possible to handle as much as 25 sacks of corn an hour, whereas in a wet season it might be possible to deal with only 10 sacks. Probably the average drying speed is somewhere about 20 sacks an hour.

Costs for the past harvest have worked out at about 2½d. a cwt. This is about twice the cost of coke, but taking into consideration the elimination of a stoker, cartage, etc. (one man can operate the electrical plant by himself), Mr. Allingham is convinced that "there is very little in it." On the other hand, the quality of the electrically dried grain is so much superior to that achieved by coke that it would normally fetch a considerably higher price, if it were not controlled as under the present wartime conditions.

To prove the efficiency of the equipment

Mr. Allingham had tests made on a very showery day when barley was combined and harvested. His buyer, Mr. S. C. Banks, was present during the tests and was responsible for taking the samples and despatching them to the Seed Testing Station, Cambridge. The germination figures are as follows:—Not dried, 95 per cent.; dried at a temperature of 98 deg. F., 97 per cent.; dried at a temperature of 120 degrees F., 98 per cent. The above temperatures were registered on the outlet duct.

We should like to thank Mr. Allingham for permitting us to inspect the plant and also Mr. H. G. T. Wild, of the Bedford Electricity Department, who has been largely responsible for the design and installation of the electrical equipment, for assisting us in this description of the apparatus.

Cleaning Economisers

Reduction of Deposits in Early Stages

THE general subject of steam boiler availability in power stations has lately become so prominent as to necessitate a better understanding of the causes of the fouling of heating surfaces by deposits from the products of combustion. Two relevant papers have been presented at a joint meeting in London of the Institutions of Electrical and Mechanical Engineers.

In one of them Messrs. J. R. Rylands and J. R. Jenkinson (E. Green & Son, Ltd.) deal principally with bonded deposits on economiser heating surfaces, accumulation of which may so reduce the output of steam that the plant has to be shut down for cleaning. Earlier theories have not satisfactorily accounted for various well-established observed facts.

The authors explain how hard bonded deposits result from chemical reactions between flue dust and sulphuric acid, the type of reaction depending on the temperature of the metal parts associated with the deposits. Investigations described in the paper have pointed clearly to certain practical ways of preventing the growth of deposits. The cycle of processes involved is summarised in eight stages; inhibition of any one of them will prevent the others occurring subsequently so that the earlier in the series the inhibition takes place the better the result will be.

Consequently only the first three stages are discussed in detail; they are the formation of the original thin film of sulphuric acid from the SO_3 and moisture in the flue gases; then the attack on the iron of the tubes by the acid, with the formation of ferrous sulphate, oxidising to ferric sulphate; followed by local "manufacture" of more acid from the sulphur dioxide and moisture in the gases, by the catalytic action of the ferric sulphate, the acid strength being dependent on the local temperature.

Frequent washing down with copious quantitites of water may remove deposits if they will crumble or sludge, but when the scale has become hard by bonding difficulties arise. This fact is often a matter for surprise, especially when small samples detached by hand appear to disintegrate readily when dropped into water. Such a test may be most misleading, since the deposit may be porous to water from its underside only, which is not exposed when attached to the economiser tubes. Of various washing media, caustic soda solution has been most successful, perhaps because aluminium hydrate is soluble in excess of such solution.

Bonded deposit can usually be softened by gradual absorption of moisture and two methods are known. The first involves "cooking" for periods of 24 hours or more in a gentle steam bath, usually by introducing a number of perforated pipes below the economiser tubes and allowing the whole chamber to be subjected to a steaming atmosphere while avoiding profuse condensation on the scale by keeping the economiser tubes filled with warm water. Such "steaming" renders the ferric sulphate more easily soluble to enable it to be washed away in one good sluicing. The second method is called "wetting and washing;" it involves damping the deposit with a fine water spray and then passing hot water through the economiser tubes until the deposit either cracks off or softens sufficiently for washing to be effective.

The insufficiency of "dry" cleaning is evident; "neutralising" agents must be avoided and no soot-blower at present available will remove or prevent bonded deposit when conditions favour its formation.

Emphasis on the need for cleansing leads to a brief study of design, which suggests that more consideration should be given to arranging the economiser in such a way that it can be conveniently cleaned. It is probable that similar provision for the air heater would be advantageous, but it is important that the air heater should have a separate hopper and that it should on no account be arranged immediately above the economiser.

Dewpoint Elevation

In the second paper Mr. W. F. Harlow (International Combustion, Ltd.) discusses causes of high dewpoint temperatures in

boiler flue gases, which induce premature condensation in the cooler gas passages, resulting in deposits and corrosion. Evidence is submitted that high dewpoint can be caused by elevating the temperature of superheater tubes, the oxide film on the latter catalysing the conversion of the sulphur dioxide formed by combustion into sulphur trioxide, thereby increasing the sulphuric acid content of the gases.

The trouble is confined chiefly to plant fired by mechanical stokers. It has increased progressively during the past ten years, the main factor responsible appearing to be enhanced catalytic action due to increase of steam temperature. Conditions have no doubt been worsened during the war by the general deterioration of fuel; but a high sulphur coal is not always more troublesome than a low-sulphur type, probably because the necessary catalytic temperature is not always reached. Air heaters are not the only parts affected; in some cases economisers, fans, ductwork and steel stacks also suffer.

Given reasonably clean superheaters, catalysis due to iron oxide is the important factor; the indications are that scale really plays little part in the action and is certainly not an essential to high dewpoint conditions. The introduction of some non-catalytic material would eliminate most of the trouble. Means of heating mild steel to prevent oxidation and possibilities of employing alternative materials are still under consideration. None of those so far tried out has been entirely satisfactory so that meanwhile means of coating the catalytic surfaces with a film of non-reactive substance while the boilers are in operation are being investigated. The hottest surfaces may be coated while they are hot by periodically spraying them with milk of lime, which may be accomplished by dosing the soot-blowing steam of the superheater blowers. Pulverised fuel plant is not seriously affected; the reason for its immunity remains to be determined, but it is thought to be due to the fine dust that is carried in the gas stream, which coats the heating surfaces and renders them inert.

Leakage of steam into flue gases plays some part in acid formation; in the presence of iron oxide the production of acid is accelerated by increased water vapour content, but in the absence of this, or any other, catalytic agent the injection of steam has relatively little effect. The author's experiments are by no means complete; further exploration may be profitably undertaken.

Women Engineers

Wartime Activities and After

IN her address as president of the Women's Engineering Society at the 21st annual conference of women engineers held in Manchester from October 22nd to 25th, Miss G. L. Entwisle, A.M.I.E.E., traced the course of events which had led up to the present prominent position attained by women in the engineering industry. Before the last war, she said, Leningrad (then St. Petersburg) had an engineering college for women only. Matters were not so advanced in England but the 1914-1918 war broke down barriers and before it ended women were working on the design of ships, generators, transformers, etc., and had obtained a footing in the drawing office and testing and sales departments. After the war many left the industry but many remained and sought further qualifications.

The first engineering body to admit women members was the Royal Aeronautical Society. The I.E.E. elected a woman (Mrs. Ayrton) to full membership in 1898 but it was 1916 before another woman was admitted and then only as a student. Other institutions followed in succession, the last being the Institute of Welding. So far only one woman had been admitted as a corporate member of the Institution of Mechanical Engineers.

In the early years of this war the Women's Engineering Society had been inundated with requests for women engineers—requests from firms which had strenuously refused to help to train women in the years between the wars. In this connection Miss Entwisle commended the Metropolitan-Vickers Co. which had taken women college apprentices for two-year courses.

Since 1939 much had been done to help women to acquire training and many hundreds had received assistance. Over half of the women who were members of the various technical institutions were engaged in aeronautics and electrical engineering. Research had attracted the largest number of workers and electronics in many branches offered scope for the future. Thousands of women had received short courses of training and were in technical posts.

After the last war women were compelled to relinquish their positions by the Restoration of Pre-War Practices Act and a similar Act had been passed during this war. Before any plans for reconstruction were drawn up it should be considered what part it was intended women should play in the post-war world. Their work during the war entitled them to consideration. If women wished to continue to work they should be free to do so and if in the future they were to be employed in engineering they should have some form of training or apprenticeship whether they were to remain in the workshop or take up technical work. If women were to go into industry it was best for the community that they should be used for maximum efficiency which could not be obtained until women were no longer cheap labour. Only when there was no difference in payment would the best person for the job be chosen irrespective of sex.

Women should receive a far more scientific education to take advantage of the facilities which should be open to them.

Electric Traction in Russia

Recent Technical Developments

By Prof. D. K. Minov

BEFORE the last war tramways were the only form of electric traction in use in Russia, and although the first of these was built as early as 1891, further development was very slow so that by 1917 there were tramways in only thirty-five of the largest Russian towns.

In accordance with the plan worked out in 1921 by the State Commission for the Electrification of Russia (GOELRO) the Baku-Sabuni-Sarakhani railway was electrified in 1925, and work on the Moscow suburban railways was commenced in 1928. This was followed by main-line and suburban electrification in other parts of the country; the first line to be operated was the Mountain Pass section of the Trans-Caucasian Railway (Suram Pass), which was opened in 1932. By 1941, 1,200 miles of main-line railways had been electrified on the DC 3,000-V system. As 1,500 V is in use on suburban sections, all locomotives entering such areas are designed to work on the two voltages.

The first line of the Moscow Metropolitan (Underground) Railway was opened in 1935. It has been steadily expanded, and in 1943 a line from the centre to the Stalin Automobile Plant was opened. By 1941 there were tramways in eighty towns of the U.S.S.R.; the larger towns also have trolley-buses. There was simultaneous intensive development of industrial electric transport, both surface and underground.

The Moscow subway was opened in May, 1935. This picture shows the inauguration of a new line on April 20th last at the Stalin Plant station

Original Soviet Designs

All the equipment is manufactured in Soviet factories. The Metropolitan Type G cars with smooth starting have been particularly successful. An original Soviet design is the Reshetov system of grouped contactors for motorised coaches, which ensures accurate sequence of operation. Another is a locomotive, completed in 1937, on which is mounted a mercury-arc rectifier for providing DC from a 50-cycle single-phase supply, smooth and economical speed regulation being obtained over a wide range by grid-control. Design of this locomotive was commenced in 1934, simultaneously with, but independently of, the construction of a similar locomotive in Europe.

Pioneering work of Soviet scientists in the development of electric traction has included that of Dolivo-Dobrovolsky on three-phase currents (1891), of A. V. Wulf (1910) on the application of the theory of probability to the calculation of the power of traction substations and of A. B. Lebedev, Silbertol, V. F. Rosenfeld and N. N. Kostromitin on the extension of the method to traction power networks. K. I. Shenfer suggested independently the idea of the Metadyne and proposed certain improvements in the commutation of motors. Investigations were also made into the protection of underground structures from stray earth currents due to traction systems.

A careful study was made of questions connected with improvement of the tractive qualities of electric locomotives and the most complete utilisation of their coupled weight. The present writer took into account the influence on these qualities of the dynamic factors of plane carriage supports and calculated the electrical parameters of traction motors, *e.g.* starting circuits and characteristic curves.

Original work of Soviet scientists also embraced methods of designing traction motors with calculation of heating and working conditions and of mechanical and electrical design of contact systems.

A general comparison of traction systems for the Soviet railways was started in 1939 by the Transport Section of the Academy of Science of the U.S.S.R. (which is headed by V. N. Obraztsov) and carried out under guidance of A. B. Lebedev and, after his death in 1941, completed by myself. People's Commissariats, factories, scientific research organisations and individual specialists also participated in the work.

Special attention was directed to uniting all the separately developed sections in a single scheme. As a rule all the contributions were examined by individual experts and then considered at plenary sessions of the Brigade of Electrification, to which the most authoritative specialists were co-opted together with representatives of individual organisations.

Comparison of Alternative Systems

As a basis various systems were analysed both from the standpoint of transport and from that of co-ordinating energy supplies to the railways with supplies to other consumers in the neighbouring districts. A comparison was made of alternative railway systems having a total length of about 18,750 miles (single-track), the electrification of which is probable within the next ten to fifteen years.

In addition to the commonly used 3,000-V DC and 16⅔ cycles single-phase AC systems, thirteen little-used or possible systems were considered, which, as technology advances, might offer the best solution from the broader political aspect. Economic comparisons were drawn between: 3,000 V DC already in use; 6,000 V DC which permits of considerable economies in non-ferrous metals and does not involve special measures to prevent interference with communication lines; single-phase 16⅔ cycles; single-phase 50-cycle AC in a number of variants, including single-phase AC to DC conversion with mercury-arc rectifiers on the locomotive.

Like the 6,000-V DC system, the last-named was first developed in the U.S.S.R. and has the great merit of allowing of unification of the power supply systems for traction and industry. The electric locomotives have very simple electrical equipment and good tractive qualities.

Electric locomotives were designed for all these various systems as well as for some others, *e.g.* single-phase 50-cycle AC with capacitor traction motors due to V. S. Kulebakin. This was accompanied by experimental work connected with the development of individual elements of the equipment.

In addition a careful study was made of the influence on the general power systems of supplying asymmetric traction loads with single-phase AC at 50 cycles. The influence of higher harmonics in DC systems with mercury-arc rectifier traction substations was also investigated. With the usual ratio of the mean transport load on the power station to the total of 0·5 to 0·6, this influence does not exceed 10 per cent. Particularly favourable results ensue from the use of twelve-phase rectifiers in substations on DC systems.

Measures were devised to protect communication lines from traction-current interference. Systems using 16⅔-cycle and 50-cycle AC require great expenditure on this account. Methods were developed for mass calculations both of traction problems and of elements of power supply. The results obtained made it possible to evaluate the parameters of sections of electrified railways working on various systems. From these parameters comparative economic data were obtained giving the capital expenditure, the consumption of non-ferrous metals and exploitation costs.

The comparison showed that the system in which 50-cycle AC is rectified on the locomotive promises favourable possibilities for future development into a system of 20,000-V DC with conversion on the locomotive by ionic apparatus into medium-voltage DC for the motors. The 16⅔-cycle system was shown to have the worst characteristics from the operational point of view.

Furthermore, the economic advantages of electric traction over steam were made clear. Fuel consumption is less than half; lower grades of local fuel may be used; independence of the coal basins and oilfields is obtained; there is considerable improvement in the loading and traffic bearing capacity of the lines, since the power of an electric locomotive is limited only by the couplings and the designed speed, and multi-unit trains may be driven from a single position.

Austrian Scientific Association

THE Association of Austrian Engineers, Chemists and Scientific Workers in Great Britain (hon. sec., Mrs. K. Hilfreich, 133, Hatherley Court, W.2) has sent us some details of its meetings. On October 25th a lecture was given by Mr. David Cushman Coyle (U.S.A.) on the Tennessee Valley Authority. At a joint meeting with the Royal Netherlands Institution of Engineers, at the Institution of Mechanical Engineers, on October 28th, a paper on "District Heating" was read by Mr. P. Kaufmann, A.M.I.Mech.E. Dr. O. P. Einerl is to present a paper on "The Present and Future Application of Light Alloys" at a meeting at the Institution of Structural Engineers on November 15th, and on November 29th at the Austrian Centre, 69, Eton Avenue, N.W.3, Mr. J. F. Shipley, M.I.E.E., will speak on "The Role of Meteorology in Engineering Enterprise."

Safety Precautions

The Importance of Skilled Maintenance

By H. Greaves, A.I.I.A.

PRECAUTIONS against shock and danger to operatives are particularly necessary in the case of portable appliances, which are subject to constant handling and misuse by unskilled workers. These remarks do not relate exclusively to the production shops, for the administrative side also makes use of electrically operated machines, such as calculating and accounting machines, typewriters, and printing and copying machines. There are also many electrical applications in the first aid sections, such as sun-ray lamps, sterilisers, kettles and hot-plates. Finally, there is the canteen with peeling, slicing, and mixing machines.

Most machine tools are push-button operated, and we can assume that the machines are put into commission with their electrical controls in first-class condition, with sound wiring and continuous earthing. If machines were also operated under first-class conditions there would be little to go wrong, but in most cutting operations oil or some form of coolant is required and this sooner or later finds its way into the connection boxes and other apparatus. The danger to operatives lies in the coolant finding its way into the push-button controls, which may cause tracking of the plastic materials used for insulation and result in the machine minder receiving a possibly serious shock. It is of little use pointing out to the operator that he, or she, is chiefly responsible through handling the push-button with wet hands; it is the duty of the maintenance staff to minimise the risk.

Form of Push Buttons

Some units are provided with neoprene compression cups to keep out coolant, but under present-day conditions these are apt to puncture and finally collapse; control-gear manufacturers do not always appear to realise the number of times a push-button may be operated in one day by a girl machinist on repetition work. I would suggest that wherever possible push-buttons should be made in the shape of a mushroom head to prevent the coolant being forced into the unit. Where made of metal they should be earthed, but they could quite well be made of insulating material.

An objection to the use of buttons, other than stop buttons, of the mushroom-head type is that since they project from the unit the machine may be inadvertently started by someone leaning against the button. This can be obviated by fitting a guard or by arranging the stop button to project further than the start button.

Frequent testing and examination of the earthing system will suggest itself as a necessary precaution, particularly when the switchgear and/or motor is situated away from the machine and earthing is by copper strip, as there is always the possibility that the strip may be removed for repair and not replaced when the machine is placed into service again. Attention to earthing is most important in installations for testing aero-engines, for in certain areas highly explosive petroleum vapour can be present. Thus it is advisable to bond all earthed metal.

Portable Appliances and Flex

Portable appliances should receive a periodical examination not less than once a month. Socket outlets should not be overlooked; I have found these subjected to much maltreatment, one common occurrence being the removal of the interlocking device to enable a non-standard plug to be used, probably for the unauthorised use of a kettle or boiling ring.

It is useless to test for earth continuity of a flexible with a lamp or even an ohmmeter, for should only one strand be making contact the test does not give any indication that the flex is faulty, and the appliance would be passed as fit for service. I prefer to use a special earth tester which passes a heavy current through the earth lead, thus proving beyond doubt whether the flex is capable of giving protection.

Under existing conditions the testing of circuits without affecting production is sometimes a difficult matter. Nevertheless, factory managers now realise that rest is essential both for workers and machines, and more attention can be paid to maintenance; it is surprising how many loose nuts can be found in oil circuit-breakers which, if not corrected, will ultimately lead to a breakdown on load. Transformers can also be examined for sludge and acidity.

The question of hours worked by maintenance staff is not given sufficient attention. I am certain that any man working for twelve hours at a stretch in hot weather soon loses interest and the job suffers.

It is far better to work eight-hour shifts with a short break for a meal without deduction of time. This results in a higher standard of work, which is of great importance for safety considerations; much of the

criticism directed against maintenance staffs can be traced to long hours, probably paid for at overtime rates, and it is not surprising that works managers are apt to look on maintenance merely as a "necessary evil."

If maintenance is to justify its name, the right type of men must be attracted to the exclusion of the "handy man," and better supervision carried out to see that machinery is really inspected and not merely looked over.

With the high quality of plant produced to-day, it is a crime to hand over the maintenance work to some half-trained individual whose only qualification is that he has installed a few thousand yards of t.r.s. cable on some housing estate. These men are a danger, and some form of test should be passed before an electrician is allowed to undertake work which, under the Home Office Regulations, calls for the employment of "competent persons." No electrician can claim to be competent unless he possesses both practical and theoretical training and experience, and has a good knowledge of all relevant regulations.

Possibly after the war there will be some form of control over the influx of apprentices into industry, both in the installation and maintenance sections of the trade. This would provide an opportunity to make sure that only those youths who are properly fitted to qualify as electricians will be permitted to continue their apprenticeship. The test should take the form of both oral and written examinations and should be based on "practical theory" related to modern electrical practice and should not contain mathematical puzzles.

If the training of the apprentice is carefully considered in post-war industry we can look forward to a higher standard of skill and knowledge, which will mean less of the type of fatalities we often read about, which are generally due to a combination of natural ignorance and lack of training.

The London J.E.A.

Some Recent Developments

OBSERVATIONS upon the Authority's proposals for the reorganisation of electricity supply in the London district have been received by the London & Home Counties J.E.A. from the Twickenham & Surbiton Corporations. These bodies state that they are strongly in favour of public ownership "upon the understanding that, in any post-war scheme for reorganisation and development, local distribution shall, subject to any necessary central co-ordinating control, be entrusted to representatives nominated by the local authorities operating in the respective local distribution areas."

Trading with the C.E.B.

The Authority is recommended to support representations made by a special committee of the Joint Committee of Electricity Supply Associations to the Electricity Commissioners on the subject of trading relations between electricity undertakings and the Central Electricity Board and between authorised undertakers.

This special committee considered that available information suggested the need for a comprehensive investigation into the existing tariffs and charges for supplies to all authorised undertakers; and that the Commissioners should be requested to carry out such an investigation.

Discharged Service Men's Pay

Generous treatment is accorded by the J.E.A. to employees who join the Forces while they are serving and upon their discharge they are reinstated in the Authority's service in the positions they would have held if they had not been with the Forces. Recently the General Purposes Committee has examined the subject of employees discharged on medical grounds. Most of these have been able to resume their duties but some have not. In the case of the latter class the Authority's sick pay regulations apply and instructions to this effect have been given. In addition to this the Committee proposes that the Authority should assist these employees to secure the satisfactory treatment of their cases by Government Departments and the proper medical treatment for their complete restoration to health if that be possible.

Joint Works Committees

Trade union proposals that the electricity undertakings should consider the appointment of works committees, representative of employers and workers, were referred by the General Purposes Committee to a special sub-committee. The suggestion was viewed favourably by the employers' side of the No. 10 District Council for the Electricity Supply Industry.

As a result of the study it is recommended that district joint works committees shall be set up for the Authority's undertaking on the lines of a draft constitution submitted to the Authority.

Severn Barrage Inquiry

IN the House of Commons on October 26th Sir Stanley Reed asked the Minister of Fuel and Power if he would state the composition of the body to which the technical aspects of the Severn Barrage and ancillary works had been remitted, when a report could be expected and whether it would be made public.

Major Lloyd George said that he had decided to appoint a small technical body to review the conclusions reached by the Brabazon Committee in the light of developments since 1933. He hoped to be in a position shortly to announce the composition of this body which would be asked to proceed with its inquiry as rapidly as possible. He would hope to be in a position to publish the report, but could not commit himself until he had seen it.

Gas Industry Reorganisation

Plan Submitted to Minister

It is claimed by the British Gas Federation that a report which it has prepared for the Minister of Fuel and Power has been approved by an overwhelming majority at district meetings to which it was first submitted. This report contains proposals for the post-war planning of the gas industry; it rejects nationalisation and State control through regional boards in favour of the facilitation or speeding up of the various methods of integration at present practised—the amalgamation or merger of contiguous undertakings; association of undertakings under the ægis of a Gas Corporation; creation of Joint Gas Authorities; and joint working arrangements between undertakings.

Parliament should appoint a standing Integration Tribunal to deal with any proposal which could not be agreed or to which the Ministry of Fuel and Power withheld its consent.

It is considered that even for undertakings buying or selling their gas in bulk nationalisation is not suitable. The electricity grid does not afford an analogy. Gas transmission costs over long distances are generally higher than those of electricity and the incidence of peak loads is more cheaply met by using gasholder storage.

"Functional integration" would be effected by a new British Gas Association (a merger of the National Gas Council and the British Commercial Gas Association) whose Central Council would be the "Parliament" of the industry. Undertakings would be represented on appropriate District Councils which would elect the Central Council. Boards and committees would be formed to deal with specific problems and there would be separate committees concerned with the particular interests of company and municipal undertakings. To secure agreed costing systems and to compile statistics there would be a statistical bureau.

Structure of the Industry

Before the war, it is said, there were 1,079 gas undertakings in the hands of 788 owners. These employed 250,000 persons directly and indirectly and had an "embarked" capital of £238 million. A total of over eleven million consumers were served. A third of the total output was sold by 268 municipal undertakings, a tenth by 310 companies controlled by nineteen gas corporations, 1 per cent. by five undertakings owned by Joint Gas Authorities and the balance by 496 independent companies. Half the gas sold comes from the fifteen largest undertakings, "but diversity of size and dispersion of units is not the chief obstacle to development. . . . Size of itself is no absolute criterion of efficiency."

It is also proposed that to ensure the correct use of all kinds of fuel National and Regional Fuel Advisory Councils should be established representative of the industries concerned and of the Ministry of Fuel and Power. In this section of the report the opportunity is taken to stress the inability to store electricity by reason of which "the problem of the load factor is more critical in the case of electricity than gas."

"Selection and Control"

It goes on to say that "by careful selection and control of the heating loads met by electricity, to ensure that they remain off-peak, considerably more than the present electrical output should be available at low prices in present plant and distribution systems, balanced by the increased use of low-priced gas for those many purposes which, without storage, represent a high daily peak. The seasonal peak, expensive to supply by either gas or electricity, could be met either by small solid-fuel appliances of improved design using coke, or by schemes of district steam heating efficiently using low-grade fuel in large boiler plants."

The report says that it is estimated that the field for gas and coke for industrial purposes could more than double the present total output of the gas industry. "With gas price tariffs corresponding to the costs of supply, the domestic purposes such as cooking, hot water and space heating, for which gas would become comparable in price with coal, could be greatly extended." Reference is made to the possibilities for gas in the projected four million new post-war homes if the industry has "equality of opportunity among its competitors."

In a reference to the need for reducing the number of types of appliances it is stated that for some time gas appliance manufacturers have co-operated with a view to meeting the special and heavy post-war demand for appliances. They have agreed sizes and ratings for gas cookers and an agreed minimum standard of performance is to be specified. "Such decisions, whilst still permitting reasonable rivalry and competition between manufacturers, will ensure the production of appliances of high performance, attractive appearance and low price."

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District Heating

Basis of the Bristol Proposals

IN last week's *Electrical Review* reference was made to a scheme for distributing hot water in a commercial area of Bristol in conjunction with the electricity supply undertaking. The subject is now being considered by the Planning Committee of the City Council, but it is not expected that action will be taken before the results of investigations by the District Heating Sub-Committee of the Department of Scientific and Industrial Research are available. In the meantime, some further particulars furnished us by the originators of the present proposals, Messrs. Arthur Scull & Co., Ltd., indicate the technical lines of this and similar schemes that are based on the generation of electricity as a by-product of a public supply of heat by means of street mains.

The area under discussion covers 335 acres of a part of Bristol that was devastated by air attack and will take several years to restore. The complete scheme is designed to provide 12 million therms (of 100,000 BThU) annually, entailing a consumption of 77,500 tons of coal in a power station utilising pass-out turbines with an electrical output of 25,000 kW. This output might be transmitted to the Feeder Road generating station of the Corporation, the installed capacity of which (40,150 kW) is not much in excess of that which would be required for the new generating plant. (The figures available show that an overall thermodynamic efficiency of from 60 to 65 per cent. is envisaged.)

Method of Distribution

The hot water would be distributed under pressure through heat-insulated welded-steel tubes run in reinforced concrete ducts to substations feeding groups of buildings, into each of which a service would be laid. It is estimated that 100,000 tons of coal would be required to provide the amount of heat required by consumers, compared with the 77,500 tons previously mentioned.

Building reconstruction and consequent full demands for steam are expected to occupy seventeen years in coming to fruition. The total capital expenditure allowed for is £1,550,000 (1939 prices) spread over fifteen years and recoverable from revenue in twenty-one years. The average annual income to meet all charges is worked out at £271,000, which could be obtained by selling hot water at 4·53d. per therm and debiting electricity with 0·214d. per kWh. It is claimed that at 4·53d. per therm, the cost of heat from the mains, taken at 100, would compare with other sources of heat, at local prices, as follows:—Electricity (thermal storage), 129; open fires, 126; gas, 121; central heating with solid fuel, 84; slow-combustion stove, 76.

High load density is a requisite of commercial success. We are informed that preliminary investigations have shown that an aggregate hourly demand of not less than 6 therms per hour per acre is needed, whereas 15·2 therms could conservatively be anticipated. Another requirement that is said to have been easily met is that the aggregate consumption must not be less than 16·3 therms per annum per acre for each foot run of conduit.

Practical Difficulties

Some of the practical difficulties connected with the public distribution of heat from steam are discussed in the *Bristol Evening Post* by Mr. S. Harper-Bill, who claims to have been responsible for a scheme under which more steam or heat was sold through meters than by any other organisation in this country, omitting industrial concerns supplying their own departments.

Taking a centrally placed generating plant serving an area with a half-mile radius, he cites an instance in which a consumer, situated at the end of a main, took a supply during week-ends when the main was otherwise unloaded. The losses in distribution in that case amounted to 92 per cent., although the main was well lagged and laid in underground ducts. In practice, he continues, it was proved that isolated plants were more economical and eventually no consumer was accepted at more than 400 yards from the generating plant.

Optimistic figures to-day would, he considers, be taken as:—Slack coal (10,000 BThU per lb.) 35s. per ton into bunkers; overall thermal efficiency of generation, 75 per cent.; overall distribution loss with half-mile ranges, not less than 20 per cent. with reasonable loading; one therm (100,000 BThU) would therefore cost 3·125d.

Repairs to Damaged Houses

THE War Damage Commission has been empowered by the Treasury to pay the reasonable cost of restoring or rebuilding houses damaged (or even destroyed) by enemy action. The houses must have been built after March 31st, 1914, or if built earlier have been as structurally sound as at the date of building and as reasonably equipped as similar houses of later construction. It will still be necessary to obtain a Ministry of Works licence for work costing more than £100, including any work carried out during the preceding twelve months. These cost-of-works payments will be made only after the completion of the work.

Wartime Liabilities

Proceedings in Respect of Protection Orders

By F. E. Sugden, A.C.I.S., Barrister-at-Law

SOME time ago I dealt with the subject of the Liabilities (War-Time Adjustment) Act as it affected the electrical contractor, showing how he could apply for protection and also the procedure in cases where a debtor sought protection against him. I dealt primarily with the position where the contractor had either sold goods retail or where he had installed electrical equipment.

Unfortunately, like many other Acts of Parliament, this one has been abused by certain debtors who have made application under the Act either to delay proceedings being brought against them by their creditors or to endeavour to evade the law to the detriment of the trader.

I recently opposed an application, on behalf of a creditor, that a certain debtor should have a final protection order made in his favour, but unfortunately the debtor obtained an interim protection order (I do not know how) during the period to prevent the creditor from taking the necessary legal proceedings.

A case recently came before the Court where an interim protection order was made on behalf of a debtor on his application to a County Court Judge, who very properly made the order pending investigation, probably because the debtor had satisfied him that there was a *prima facie* case in this direction and therefore after making an interim protection order the Judge referred the matter to the Liabilities Adjustment Officer for his report. Suppose the creditor feels in his own mind that such an order should not have been made or at least should be cancelled as early as possible. My advice to him is to apply to the Court after consultation with the Liabilities Adjustment Officer.

Delaying Tactics

In the particular case to which I refer it was not the creditor who was not satisfied but the Liabilities Adjustment Officer who, owing to the complexity of the case, felt that it was no use spending money in investigation when the ultimate result would be that no protection order would be made and his efforts would only be delaying the rights of the creditor.

The Liabilities Adjustment Officer applied for directions, in accordance with the Act, as to what procedure he should adopt. He felt in his own mind that no satisfactory result would come from his report, and that it was one of those cases which should not be protected under the Liabilities (War-Time Adjustment) Act. The Judge very properly took the view that that was so and accordingly discharged the interim protection order as from a specific date so that the creditor could take the necessary steps, such as enforcement of his debt by committal or bankruptcy proceedings.

The debtor appealed to the Court of Appeal on the grounds that the Liabilities Adjustment Officer applied only for direction and the County Court Judge was not entitled to cancel the interim order. The Court of Appeal upheld the Judge, stating that he was right in cancelling the interim protection order when he was of opinion that this would only defeat the ends of justice by delaying any proceedings which could be taken against the debtor.

Advice to Creditors

My advice to a trader who is in doubt as regards the genuineness or otherwise of an application for an interim protection order, is that he should place the facts before the Liabilities Adjustment Officer and he himself apply for a discharge of the interim protection order so that he can proceed immediately against the debtor while he (the debtor) still has funds in his possession.

When an application is made by a trader for the discharge of an interim protection order or an application is made by the debtor for a final protection order, the trader should buy a copy of the Liabilities Adjustment Officer's report before the hearing of the case so that he can be in a position to cross-examine the debtor as if they were bankruptcy proceedings.

Regarding the contents of the Liabilities Adjustment Officer's report, the main thing is that it is distinct from bankruptcy proceedings, and that the debtor is very properly officially cross-examined regarding his present financial position in an endeavour to check his statement. The report says that the statement and figures were submitted to him by the debtor and, technically, the Liabilities Adjustment Officer must accept them.

The creditor through his lawyer must certainly attack the report, not casting reflection upon the Liabilities Adjustment Officer but upon the debtor's veracity. The Judge then decides whether the case should come under the Liabilities (War-Time Adjustment) Act or not.

RECENT INTRODUCTIONS

Three New Lamp Fittings

Infra-red Reflector

THE latest reflector for use with 250-W, 100/130-V infra-red industrial lamps announced by the METROPOLITAN-VICKERS ELECTRICAL CO., LTD., Trafford Park, Manchester, 17, is, like previous models, made of pressed steel with gold plating on nickel, and is complete with H.O.pattern skirted lampholder.

In addition to the complete flexibility of construction which is provided by the use of individual reflectors, the adoption of a plated hexagonal flange provides increased efficiency due to the redirection of a large portion of the radiant energy which, in the case of the round type, is lost. Glare to persons employed in close proximity to the tunnel and heating of the surrounding surfaces is considerably reduced. Free ventilation and screening of radiation between adjacent lampholders prevents damage to the lamp-cap due to excessive heating.

Infra-red reflector

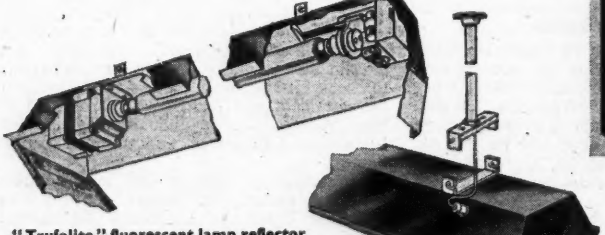
The dimensions are 8$\frac{7}{8}$ in. across the flats of the hexagon and 8$\frac{1}{4}$ in. diameter reflector mouth. The overall height is 7$\frac{1}{8}$ in. from the fixing straps to the flange; $\frac{1}{4}$ in. diameter fixing holes are provided drilled at 3$\frac{1}{4}$ in. centres.

Fluorescent Lamp Fitting

A trough reflector for tubular 80-W fluorescent lamps announced by the REVO ELECTRIC CO., LTD., Tipton, Staffs, is unusual in that the control accessories are housed within the trough-ends, so avoiding the usual protuberances, which improves appearance and is advantageous when head-room is limited.

This "Trufolite" fitting is provided with a universal mounting fixture suitable for tube or chain suspension, wall or ceiling fixing. Self-alignment is assured and the design permits of instantaneous lowering of the reflector for cleaning. Hinged end-covers, specially formed to eliminate dark patches, are fastened by means of smooth-action clips and afford immediate access to control gear and lampholders.

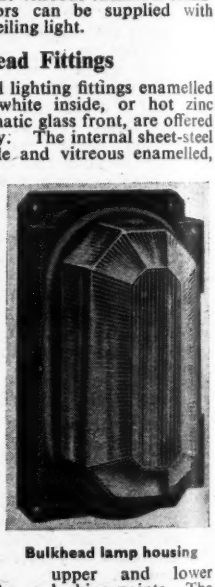
Replacement of starting switches has been facilitated, opening finger rings for the covers automatically resume their original position against the covers when closed. Plug and socket detachability provides for disconnection from mains supply. A mains terminal block is also fitted, should plug and socket connection not be required. At one end of the fitting the shockproof lampholder is spring-loaded and travels on a metal slideway, allowing for lamp length variation. The lampholder rotates and ensures ready lamp engagement at the other end. The internal wiring is carried through the beading along the edges of the reflectors, obviating the necessity for any special wiring channel. Stove-enamelled finish fittings can be supplied but vitreous enamel is standard. These reflectors can be supplied with apertures affording ceiling light.



"Trufolite" fluorescent lamp reflector

Bulkhead Fittings

Cast-iron bulkhead lighting fittings enamelled green outside and white inside, or hot zinc sprayed, with a prismatic glass front, are offered by the same company. The internal sheet-steel reflector is removable and vitreous enamelled, and the lampholder, 40 to 100 W, is of the porcelain shockproof type. The prismatic glass front, which causes a wide lateral distribution of light, is smooth outside and secured in a hinged weatherproof door having upper and lower locking points. The fitting is normally tapped for conduit entry at the top and a wireguard is obtainable as an extra.



Bulkhead lamp housing

PERSONAL and SOCIAL

News of Men and Women of the Industry

IN our last week's issue Maidstone Corporation invited applications for the post of general manager and engineer of the Transport Department. The Corporation now informs us that, health permitting, **Mr. A. T. Lambert,** the present general manager and engineer, has agreed to continue to the end of the war. A notice cancelling last week's advertisement appears in our advertisement pages to-day.

Mr. W. R. T. Skinner, whose appointment as general manager of the Yorkshire Electric Power Co. and of the Electrical Distribution of Yorkshire, Ltd., and its subsidiary and associated companies, we recently announced, was educated at Abingdon, where he was in the school O.T.C. In 1916 he joined the Middlesex Regiment and served in France from December of that year to March, 1918. In 1919 Mr. Skinner entered King's College, London, where he obtained an honours degree (B.Sc. Eng.) in mechanical and electrical engineering and the College diploma in engineering with advanced mathematics. On completing his engineering training in 1921 he joined the Yorkshire Electric Power Co., with which he has been associated ever since.

He became a student member of the I.E.E. in 1920, and was a representative of King's College on the London Section Committee. He was the first chairman (for two years) of the North-Midlands Students' Section and became an associate member of the I.E.E. in 1929. He was honorary assistant secretary of the North Midlands Centre from 1929 to 1932, honorary secretary from 1932 to 1938 and a member of the Committee from 1938 to 1941. He is an associate member of the Institution of Mechanical Engineers and a member of the Council of the Incorporated Association of Electric Power Companies.

Mr. H. C. Babb, general manager of the Lothians Electric Power Co., has retired, and **Mr. H. A. Collyns** has been appointed to succeed him as from January 1st.

The Seaham Urban Council has referred back for further consideration a recommendation to increase the salary of the electrical engineer (**Mr. J. S. Forster**) by £38 per annum, under the unit assessment schedule. Moving the reference back, Alderman Blackwell said that " in some future month they might have a very big increase in unit consumption, which would result in an official having a bigger salary than the Council's Clerk."

The Civil Defence and General Purposes Committee of the London County Council has recommended that Messrs. D. J. Bolton, T. H. Jones, W. F. Marchant, I. J. Hayward, B. J. Samels and A. R. Stamp shall be the Council's representatives on the London & Home Counties Joint Electricity Authority for the three-year period ending in December, 1946.

Mr. A. Brampton, in his speech at the annual meeting of the Renold & Coventry Chain Co., Ltd., on October 29th, stated that on account of his failing sight he had decided to relinquish his chairmanship of the company and had tendered his resignation to the board, who had appointed the managing director, **Mr. C. G. Renold,** to be chairman in his stead. Mr. Brampton is retaining his seat on the board. Mr. Renold is resigning his position as managing director, and **Mr. R. O. Herford,** who has been works director of the company for many years, succeeds him in that position. Mr. Herford is at present with the Ministry of Supply.

Miss M. Partridge, B.Sc., A.M.I.E.E., has been elected president of the Women's Engineering Society for 1943-44. She succeeds **Miss G. L. Entwisle,** A.M.I.E.E., a summary of whose presidential address at the Society's annual conference is given on page 600 of this issue.

Mr. T. E. R. Sanderson has been appointed deputy superintendent mains engineer with the Slough Trading Estates, Ltd. He served his apprenticeship with A. Reyrolle & Co., Ltd., and was a test engineer on the South East grid scheme in the early days of the C.E.B. He was for three years on the staff of the London Power Co. at Battersea power station and for six years was with the Fulham Electricity Department as electrical test engineer.

Mr. J. A. Eden, charge engineer in the Fulham Borough Council Electricity Department, retired on October 31st on the ground of ill-health, and **Mr. T. H. Taylor,** chief clerk in the Electricity Department is to retire on November 19th for the same reason.

At a recent dinner at Hebburn, presentations were made by Colonel B. H. Leeson, a director of A. Reyrolle & Co., Ltd., to **Mr. J. S. Hunter** and **Mr. T. Hepple** who have been transferred to managerial positions at another of the company's branches. Mr. R. Cowans presided.

Mr. J. G. Curtis, A.M.I.E.E., district mains engineer with the Carlisle Corporation electricity undertaking, has been appointed mains superintendent to the Kirkcaldy Corporation Electricity Department.

Obituary

Mr. S. J. Ebbutt.—The death has occurred at the age of sixty-seven of Mr. S. J. Ebbutt, who joined W. T. Henley's Telegraph Works Co., Ltd., in 1910 and retired from full-time duties in 1936, although his services were retained by the company until his death. Throughout his service he represented Henley's as a London area traveller.

Mr. John Hoyle, assistant mains superintendent in the Rawtenstall Electricity Department, received burns to his face and hands at the electricity works on October 28th and died in hospital the following day. Mr. Hoyle, who was thirty-two, had been with the Department since leaving school.

Mr. A. E. Powell.—The death occurred on October 25th at Rye, Sussex, at the age of sixty-nine of Mr. Alfred Everett Powell, M.I.E.E., who, until his retirement in 1932, was vice-president in charge of plant and engineering of the Commercial Cable Co. Mr. Powell was born in England in 1874 and received his training at the Chelmsford works of Crompton

& Co., and at University College, London. Later he joined a storage battery company, and in 1915 became associated with the Western Union Telegraph Co., in London, going to New York in 1920 as general plant manager of ocean cables.

He became chief plant engineer to the Commercial Cable Co. in 1924, and was appointed vice-president in charge of plant and engineering in 1929. He retired from that position owing to ill-health.

The late Mr. C. Furness

Mr. C. Furness.—The death occurred recently of Mr. Charles Furness, for many years borough electrical engineer and transport manager at Blackpool. He was seventy-two years of age. Mr. Furness was appointed borough electrical engineer in 1902 and succeeded Mr. J. Lancaster as transport manager in 1910, holding the dual post until 1932. He retired in 1936. The funeral took place at Singleton, near Blackpool, on October 30th.

Mr. F. H. Rudd, whose death is reported at the age of sixty-six, was until his retirement engineer and manager of Rochdale Corporation Electricity Department, a position which he held for twenty-five years. He was educated at Bolton Technical School, Manchester College of Technology and University College, London.

Ald. H. J. Sayer.—The death occurred on October 25th, in his eighty-seventh year, of Alderman Henry James Sayer, who for many years was a director of Joseph Lucas, Ltd., and was chairman from 1920 until his retirement in 1937. He took a prominent part in municipal affairs in Birmingham and in recognition of his services the honorary freedom of the city was conferred on him during the centenary celebrations in 1938.

Will.—The late **Mr. H. C. Slingsby,** truck manufacturer, left estate valued at £193,235 (£180,920 net personalty).

Industrial Coal Supplies

AT the annual general meeting of the Fuel Luncheon Club on October 28th, the election of Mr. John Charrington as president for the coming year, in succession to Sir David Milne-Watson, was confirmed. Mr. Charrington then addressed the members on "Certain Aspects of the Marketing of Coal." After referring to the Control Boards set up under the Coal Mines Act of 1930 and charged with the duties of regulating production and imposing minimum selling prices and to the introduction of selling schemes in 1935 (which were renewed by Parliament in 1938), he dealt with the undertaking obtained by consumers from the Central Council of Coal Owners that a change of source of supply would be permitted for good reasons other than price. His view was that the risk of high prices received undue emphasis compared with that of arbitrary decisions upon the coal that consumers might receive. Apparently the coal owners were the arbiters of what constituted "good reasons" and no district would lightly part with a valuable order.

Without advocating competition in prices, he considered that this had stimulated the finding of new outlets for coal and improvements in methods, for example, cleaning. A similar stimulus would be found at controlled prices if the coal industry based its policy on securing the goodwill of consumers and did not rest content with an assured market in each district. Oil competition was to be feared (as in the heating of important buildings in London) if the public felt it had to buy coal arbitrarily allotted. The objects of research, upon which the coal industry was now spending greatly increased sums, would be frustrated unless consumers could buy the kinds of coal best suited to their purposes. Technical qualities of various coals would play an increasing part in marketing and it was gratifying that the Mining Association had recently invited the co-operation of the British Coal Utilisation Research Association in grading.

Fuel Research

A PRELIMINARY meeting of the Standing Consultative Conference on Fuel Research, which has been constituted by the Department of Scientific and Industrial Research, was held on October 21st. In the absence of the chairman, Sir Harold Hartley, through illness, Sir Edward Appleton presided over the meeting at which representatives of the Ministry of Fuel and Power, the British Coal Utilisation Research Association, the British Electrical and Allied Industries Research Association, the British Refractories Research Association, the Gas Research Board, the British Iron and Steel Federation (Industrial Research Council) and the British Hard Coke Research Association were present.

Sir Edward Appleton briefly described the object of the Conference, as the provision of means whereby research organisations might assist each other by interchange of information and by discussions, emphasising that membership was voluntary and at the invitation of the Department. The setting up of a central body to undertake the preparation and publication of abstracts of current literature relating to fuel and the maintenance of a register of translations was discussed. At the next meeting to be held early in January, the fuel research programmes of the member organisations will be considered by the Conference.

Allocation of Drills

UNDER the Control of Machine Tools (Twist Drills) (No. 1) Order, 1943, a High Speed Twist Drills Allocation Centre was set up to deal with orders for standard drills with Morse taper shanks up to 3 in. diameter or straight shanks up to 1¼ in. The Centre's operations have now been expanded to cover standard high speed steel straight shank jobbers' twist drills from 3/32 to ½ in. diameter rising by 64ths and from 0·5 to 13 mm. rising by 0·25 mm. steps; wire gauge sizes Nos. 1 to 80, letter sizes A to Z. As from November 1st the procedure laid down in the above-mentioned Order must be followed in respect of these drills.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

Power Engineers' Salaries

IT appears to me that the claim of electrical power engineers for improved salaries is liable to be ineffective because the members have not made up their minds on what grounds it should be based. The alternative reasons are (1) that we are not getting our share of the spoils of war or (2) that the agreement on which our salaries are based has been rendered unfair by a change in conditions which could not be foreseen when it was made. The first reason carries with it a loss of prestige and I think would be against the spirit which was behind the cost-of-living basis of remuneration. That spirit could be expressed as follows: "Guarantee us a reasonable standard of living and let us concentrate on the job."

There are good grounds for claiming a revision of the agreement under the second alternative. In the first place, was it ever envisaged that we should be forced to pay a levy which would be used to keep down the apparent cost of a few items of food on which a fictitious index was based, while many other items, just as necessary to a reasonable standard of life, would increase it to many times the previous cost but would be ignored in that index? (The Editor of the *E.P.E.A. Journal* can apparently only find this argument "curious." If Lord Woolton decided to give us potatoes free at the cost of another sixpence on the income tax would it then be only "funny" for us to have a £5 reduction in salary as well?) If it is argued that the standard of living must be lower in wartime, then, apart from the obvious fact that this is not so with the great majority of the working population, on what grounds can we be expected to have a double reduction both by tax and by income?

Secondly, the great majority of the industry's members have their salary based on the maximum demand of their undertaking. Was it foreseen that this maximum demand would be purposely restricted by various devices operated by the very people whose income is thus decreased by their own efficiency? The upgrading of undertakings is often delayed for several years in this way.

The question of those who are expected to give their week-ends, nights and all their liberties to their employers also needs reconsidering, if it was considered at all in the first agreement.

It is well to remember that if we "share the spoils" now we must be prepared to "share the sacrifice" after the war when the cry will doubtless be "economy" and city and town councils will be the first to call on us to be patriotic. If the E.P.E.A. claims to represent the industry I suggest that it is several years behind in perceiving and challenging the violation of the agreement, the making of which it claims as the main reason why everyone should join its organisation. I, for one, would be more inclined to do so if it fought for principles which affect every member, rather than concentrating on individual cases of dissatisfaction while ignoring the growing discontent of the many.

MUNICIPAL.

Domestic Fused Plugs

BEFORE dealing with some of the interesting points raised in Mr. R. Amberton's article, it would appear necessary to establish certain fundamentals. It is assumed, for instance, that a 30-A ring main means a ring main consisting of 15-A cables, so that two 7/·029 or 7/·036 cables are required to enter each terminal of the socket. This should not be difficult.

What circuits are to be served by this ring main? According to Mr. Amberton there should be three main fuse-ways in the house installation:—(1) Cooker; (2) lighting; and (3) ring main. I have always understood, however, that the ring main would accommodate *all* sockets in the house, including lighting sockets, although fixed lighting points would be served by a separate main circuit. This is borne out by the recent I.E.E. paper, "The Future of the Domestic Installation," in which the ring main proposal was first put in any official form.

If this view is correct, Mr. Amberton's 10-A fused plug will be unsuitable, as it is neither necessary nor desirable to feed standard lamps through 10-A fuses and 10-A flexibles. Obviously, we cannot have different capacities of fuses, say, 10-, 5- and 2-A for the same plug, as the wrong one will invariably be fitted, with consequent inconvenience, or even danger.

I have given the matter of domestic ring mains some thought, and have come to the conclusion that the most satisfactory solution of the socket problem will be to standardise a flat-pin socket and plug of 10-A capacity for this purpose. This socket would accommodate a 10-A, a 5-A or a 2-A fused plug, for the radiator, the kettle and the vacuum cleaner, and the standard lamp respectively, without loose adaptors, and possibly two together, with suitable precautions — the

smaller plug fitting into the top of the larger, for instance. I feel that the desirability of different capacities for differing purposes is inescapable, and is not difficult of achievement—in fact, an existing range of flat-pin sockets and plugs will do it.

No doubt the same solution is in the minds of the I.M.E.A. Council and is behind its pressure for a flat-pin standard, but it would be helpful to have this confirmed.

Cambridge. T. C. GILBERT.

Federation for Export

THE letter from Lord Strathspey in your issue of October 22nd, makes a most important contribution towards the solution of the problem of how to expand our export trade, but may I be permitted to carry his suggestion a little further?

What I propose is that each federation should form an export market research organisation to discover, and set out as simply as is intelligible, the conditions and habits of prospective buyers overseas, country by country, although a world investigation is indicated. A useful extension of the service would be the establishment of a dependable advisory selling department. The financing of these organisations could be arranged by subscription of capital on fixed-interest terms, this interest being met, and the capital safeguarded, by the fees chargeable to the companies buying the reports or otherwise availing themselves of the research.

By such a plan individual businesses would be in a comparable position to the large and successful organisations which have their own means of assessing the needs of a given overseas market and control the distribution of their goods through all channels until they reach the ultimate consumer.

*London, W.C.*2. H. G. SAWARD.

A Planning Programme

President's Address to Institution of Civil Engineers

IN his presidential address to the Institution of Civil Engineers, Dr. David Anderson points out how the whole of the amenities of modern life are the results of planned and applied engineering. Descriptions are given of planning in Soviet Russia, Germany, Italy, and the United States. In Great Britain the machinery of government is complex, comprising, under the Crown, a combination of Parliament, Ministers, and the Civil Service. Nowhere in this structure is there machinery for planning ahead.

Owing to the changes in modern life some 10,000 specialists, or experts, have had to be brought into the Civil Service machine to deal with technical matters. In practice they are not allowed to ascend to the highest administrative posts and they do not have direct contact with the Minister. The Post Office has abandoned this system, partly owing to the fact that it is a revenue-earning department and partly owing to the importance of scientific developments in its engineering services.

Suggested Centre

The advantages and disadvantages of planning are reviewed, and a programme of planning is suggested, covering the rebuilding of towns damaged by war; home and empire communications; the distribution of labour; handling and distribution of food; the armed forces and the merchant service, in peace and war; the husbanding of natural resources; chemical engineering; and research. Suggestions are also made for the formation of a Joint Planning Centre to study these matters and the many others that will arise; for the education of public opinion by the technical institutions by lectures, articles, books, and broadcasting; and for a greater representation of universities and colleges in Parliament.

Finally, the spiritual side of planning is emphasised, and engineers are urged to keep high ideals and high standards before them, so that they may not only "direct the great sources of power in Nature," but also direct the forces of human nature into right channels.

Colour and Stereoscopic Television

ADDRESSING the British Institution of Radio Engineers in London, Mr. J. L. Baird described the development of colour and stereoscopic television since he first demonstrated both systems in 1928, when three-aperture spirals on a disc were used in conjunction with colour filters and colour glow discharge lamps. His present system of three-colour stereoscopic 500 lines can be viewed directly and the 600-line system requires the use of coloured glasses by the viewer.

Mr. Baird described the numerous experiments he had conducted during the past fifteen years and stated that his systems were now sufficiently advanced to be used for public service if facilities were available. He considered that within five years after the war these systems would be extended to the whole of Great Britain by means of radio links. For television transmission, he felt that for this new system no alteration in television receiving apparatus would be necessary and that only minor changes in the transmitters would be required.

For the purpose of showing up-to-the-minute films of immediate public interest, Mr. Baird was of the opinion that when television broadcasting recommenced, cinemas would show regular television "news reels" and, further, the three-colour 500-line system would, in Mr. Baird's opinion, be used in the television-telephone.

COMMERCE and INDUSTRY

Amendment of Control Order. *£1,600,000 Housing Plan.*

Industrial Equipment Control

THREE amendments to the original Order (*Electrical Review*, April 16th, 1943) are introduced in the Control of Industrial Electrical Equipment (No. 2) Order, 1943 (S.R. & O. 1943 No. 1537, Stationery Office, price 1d.), which came into force on November 1st. They are as follows:—

(1) Article I (1) of the principal Order prohibits the supply of industrial electrical equipment except to persons who are authorised by licence to *acquire*. Under the terms of the amending Order, the Director of Industrial Electrical Equipment will be in a position to issue a *disposal* licence enabling the supply of stated equipment to be made without an acquisition licence.

(2) Article I (2) (*d*) of the principal Order exempts from licence in certain circumstances the acquisition by scheduled undertakings of certain equipment, including DC motors. The supply position for DC machines makes it more necessary than ever that ordinary industrial demands shall be met from the second-hand market where possible. As a step to this end, the facility available to scheduled undertakings is now modified so that acquisition of DC motors is no longer exempt from licence.

(3) Under the terms of the principal Order, all static condensers designed for power-factor correction are subject to licence. As condensers for use with electric-discharge lamps are now subject to licence under the Discharge Lamp Lighting (Control) (No. 1) Order, 1943, made by the Minister of Works, the amending Order exempts from licence the acquisition of such condensers by persons who have been licensed by the Minister of Works.

Amendment (2) is of immediate importance to manufacturers and other suppliers as orders for DC motors from scheduled undertakings will no longer be acceptable by virtue of the usual declaration.

Disposal licences will in general be reserved for special transactions which, for one reason or another, are more efficiently handled by this method than by acquisition licences.

Municipal Trading at Luton

Further reference to trading from Luton Corporation's electricity showroom was made in a recent report by the Electricity Committee, which the Town Council has confirmed. It was stated that the town clerk and the electrical engineer had met Mr. A. F. Plummer, chairman of the Luton branch of the Electrical Contractors' Association, and had discussed with him a complaint that the Corporation was displaying replacement elements for irons and other small accessories in the showroom windows.

At the meeting the town clerk stated that it appeared that the complaint was obviously based on a misunderstanding as the Corporation had not at any time made any arrangement with local electrical contractors to refrain from selling appliances and accessories at the showroom. The only arrangement was that it would not undertake electrical wiring work or " push " the sale of lamps. As that undertaking had been strictly observed, the complaint was groundless.

The borough electrical engineer had stressed the importance of post-war electrical development and had stated that, if, and so long as, he had the full co-operation and goodwill of the electrical contractors in the electricity undertaking's development plans, he was prepared to recommend the Committee to continue the present arrangement. Mr. Plummer had expressed himself as satisfied with the interview and had agreed to convene a meeting of his branch to which the borough electrical engineer would be invited for the purpose of discussing electrical development.

Large L.C.C. Housing Scheme

The Housing and Public Health Committee of the London County Council has approved a tentative scheme of development for the Grange Hill, Essex, site which is about 291 acres in extent. It is proposed that a total of 2,776 dwellings of various sizes shall be erected, together with an estate office and superintendent's house.

The estimated total cost of development of the site, based on building prices ruling in 1939, is about £1,600,000, but the Committee proposes that the submission of a capital estimate shall be deferred until building operations become possible. Instructions have been given for the working drawings to be proceeded with. It is proposed that the co-ordinative work involved in the supervision of the contracts or other arrangements for the development of the site shall be entrusted to the Council's chief engineer.

Industry After the War

Speaking at a meeting of members of the Federation of British Industries in Manchester last week, the president of the F.B.I., Sir George Nelson (English Electric Co.), said that with wise leadership and good judgment British industry would be able to provide steady employment to a maximum number of people for some years after the war. The industries of this country and the United States would be fully occupied with home demands and export needs should be arranged by agreement between the two countries.

Control of prices and rationing would have to continue on a diminishing scale in order to avoid inflation when there was a great demand for limited supplies. Key men whose services would be required in the change-over to normal production should be released from the Services at an early date. Taxation should be reduced as soon as possible and due relief given for depreciation and wasting assets.

Sir George maintained that only private enterprise could ensure proper service to the public at lower cost. The nationalisation of industry would result in a lowering of our position and of the workers' standard of living. Private enterprise had to be efficient so that it could justify itself by its results.

If we were to achieve security from aggression there must be some measure of cartelisation. No country should be allowed to live in prosperity at

the expense of unemployment and misery in another; otherwise war would come again. In the second place, efforts must be made to ensure that capital and manufacturing capacity were not created greatly in excess of the world's needs. Cartelisation should organise for efficient production with consequent lower prices to serve a country's needs and its share in world demand. Should this method be associated with an economic price level there would still be wide scope for enterprise and initiative in service and quality.

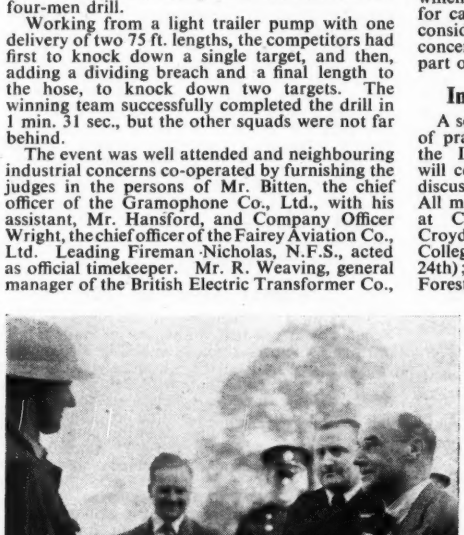
Sir George said that he realised that cartelisation could not be applied to all types of industry. He did not overlook the fact that the small and medium-sized units had played a great part in our industrial development and must continue to do so.

Works Fire Brigade Competition

An inter-squad fire brigade competition was held recently at the works of the British Electric Transformer Co., Ltd. Seven squads took part in the event, which comprised a standard N.F.S. four-men drill.

Working from a light trailer pump with one delivery of two 75 ft. lengths, the competitors had first to knock down a single target, and then, adding a dividing breach and a final length to the hose, to knock down two targets. The winning team successfully completed the drill in 1 min. 31 sec., but the other squads were not far behind.

The event was well attended and neighbouring industrial concerns co-operated by furnishing the judges in the persons of Mr. Bitten, the chief officer of the Gramophone Co., Ltd., with his assistant, Mr. Hansford, and Company Officer Wright, the chief officer of the Fairey Aviation Co., Ltd. Leading Fireman Nicholas, N.F.S., acted as official timekeeper. Mr. R. Weaving, general manager of the British Electric Transformer Co., Ltd., and Mr. J. V. Daniel, assistant general manager, were present during the proceedings. Mr. Weaving presented the prizes. Squad Leader Bowler took charge of the Trophy Cup, each member of the winning team being presented with small silver cups. The runners-up, under Squad Leader Humphreys, were awarded silver medals.



Mr. R. Weaving presenting the trophy to the winning team at the B.E.T. Co.'s fire brigade competition

Repairs to Public Service Vehicles

Representations have been made to the Ministry of War Transport and the Ministry of Supply urging the need for immediate steps to be taken to facilitate major repairs to the bodywork of public service vehicles without which many may have to be withdrawn from essential services. The Public Transport Association points out that the difficulties appear to arise from the fact that the Ministry of Supply will not permit those bodybuilders who are constructing new bodies for vehicles to undertake any major repair work. Recently the Ministry of War Transport announced a scheme for the rehabilitation of public service vehicles under which only five firms of bodybuilders are available for carrying out such repairs. The Association considers that all the recognised bodybuilding concerns should be permitted to make some part of their capacity available for repairs.

Informal Discussions on Welding

A series of meetings for the informal exchange of practical information has been arranged by the Institute of Welding. The programme will consist of a short film followed by general discussion, in which questions will be invited. All meetings begin at 6 p.m. and are to be held at Croydon Polytechnic, Scarbrook Road, Croydon (November 17th); East Ham Technical College, Barking Road, East Ham (November 24th); South-West Essex Technical College, Forest Road, Walthamstow (December 1st); Wimbledon Technical College, Gladstone Road, Wimbledon (December 9th) and Acton Technical College, High Street, Acton (December 15th). Similar meetings, to be held after Christmas, have been arranged at Lewisham, Enfield and Willesden. Non-members of the Institute are invited to apply for guest tickets to the secretary at 2, Buckingham Palace Gardens, S.W.1.

Coal Saving

There is much of electrical interest, direct and indirect, in the latest number (22) of the *Fuel Economy Review*, which is issued annually by the Federation of British Industries (2s. 6d.) An article on efficient utilisation of electricity, by Mr. J. N. Waite, gives the kind of elementary information needed by the non-electrical man in support of the axiom that true economy is wise spending. He points out that since the less efficient generating stations are the last to come into operation on the grid, the saving through not using non-essential electrical apparatus is more nearly 2 lb. of coal per kWh than the 1·5 lb. often taken as the average for all stations. Of topical interest also is a description of a combined power and process

steam installation. A third article deals with the use of instruments in the boiler house and a fourth with thermostatic control in a variety of applications. Other contributions include practical instructions for improving boiler plant efficiency and for maintaining economisers, and notes by the Ministry of Fuel on industrial fuel efficiency and on plant maintenance. Those who wish to follow what competitors are doing will find of interest two articles on developments in the gas industry, especially in regard to heat treatment. In the latter comparisons are made with solid fuel but not with electricity, which is being so successfully and increasingly used in the same field.

Copper Development Association

The tenth annual general meeting of the Copper Development Association was held in London on October 27th, and was attended by representatives of member companies. Owing to the unavoidable absence of the chairman of the Council, Mr. D. Owen Evans, M.P., the chair was taken by Mr. E. Pam, O.B.E.

In his speech Mr. Pam pointed out that this year's meeting marked the completion of the Association's first decade of operation; when it was formed in 1933 it was one of the first of its type in this country. It had proved its value and it was significant that since its inception a number of other associations on substantially similar lines had come into being. The need for the Association in the future would be greater than ever before. Copper would undoubtedly be faced with greater competition from other materials and would require the backing of all the research and development that could be brought to bear. In addition, many set-backs resulting from wartime conditions would have to be made good. Since the outbreak of war activities had been greatly curtailed but an active nucleus had been maintained which was capable of quick expansion. It was necessary that vigorous expansion should take place at the earliest opportunity and that the activities of the Association should be developed to an extent even greater than that prevailing before the war.

Fatalities

Electrical Injury During Operation.—At an inquest on Mrs. Harriet Rebecca Thorpe, aged fifty-three, who died at Farnborough Hospital, Kent, the jury returned a verdict of "Death through accidental causes," the cause of death being cardiac failure following an electrical injury to the brain during an operation. They expressed the view that the servicing of the electrical apparatus was unsatisfactory.

Shock from Radio "Earth."—A five-year-old boy, Matthew Layden, of Belfast, received a fatal electric shock through touching the earth wire of a radio set while playing in a neighbour's garden. An official of the City Electricity Department who had examined the set, stated at the inquest that when condensers had been replaced in the set the connection had been made by twisting the new wires and original wires together and covering the joint with insulating tape. The tape had come off and the bare wire was making contact with the end of the mains supply lead in the set, resulting in the mains voltage being conducted to the earth terminal. The bare earth wire connected to the terminal was alive. The earth tube was making very poor contact with the earth. He expressed the opinion that no mains-operated set should be connected to the supply other than by means of a three-pin plug and three-core flexible, which should be installed by a fully qualified person. A verdict of "Accidental death" was recorded.

Apprentice Blacksmith's Death.—At an inquest held recently at Bearpark Colliery, Durham, on Joseph Farrey (17), an apprentice blacksmith, Thomas Sweeting, colliery blacksmith, stated that when they were putting a stone creeper in order the motor stopped and he told Farrey to go for the electrician. Edward Clark, another blacksmith, came along and said the trouble was due to the fuses. Sweeting alleged that Clark opened the fuse box and then the switch box door immediately below the fuse box. Farrey, he said, put his hand round the door and into the switch box. Witness struck Farrey's left shoulder and knocked him off the switch, but he fell back, then whirled round and dropped to the ground.

It was stated that notices were posted near all electrical apparatus warning unauthorised persons not to interfere with it in the event of a breakdown. Clark was at the inquest but did not give evidence. A verdict of "Accidental death through inadvertently touching live terminals on a switch" was returned.

Commercial Travellers' Benevolent Institution

The annual court of governors of the Commercial Travellers' Benevolent Institution will be held at 4b, Frederick's Place, London, E.C.2, on Wednesday, December 29th, at noon.

Changes of Address

The London office of Ferranti, Ltd., has been moved to 36, Kingsway, W.C.2. The telephone number is unchanged.

Omega Lampworks, Ltd., has moved its offices and stores to Princes Cinema, 269, The Broadway, Wimbledon, S.W.19.

Hopkinsons' Centenary

Hopkinsons, Ltd., of Huddersfield, have completed one hundred years as manufacturers of boiler mountings and valves. It was in 1843 that Mr. Joseph Hopkinson commenced the production of engineering fittings, including "safety" boiler mountings and valves; since then the business has been considerably extended and its name is familiar in all parts of the world.

INFORMATION DEPARTMENT

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the makers of the following:—

WARD'S LUXURY electrical ranges.

PACKARD ROTA shaver spares.

Avamore Engineering Co., present address.

Argentine Foreign Trade

Electrical Imports and Exports during 1942

THE Argentine Government continues to publish statistics of the country's foreign trade and has issued those covering the year 1942, without, however, giving details of the countries of origin or destination of the various classes of merchandise.

From these statistics the accompanying totals of imports of electrical goods have been extracted and a note added of increases or decreases compared with 1941. The values given are those assessed by the Argentine Customs. It is not yet possible to give comparative figures on the basis of invoice values but the Statistical Department at Buenos Aires has decided to adopt that valuation (the exchange value of the peso is 17 to £).

The electrical trade as a whole totalled a little over 15,000,000 pesos in value against 24,250,000 pesos in 1941. It will be seen that the only increases worth mentioning occurred in radio-telephone apparatus (other than receivers) and meters. Particularly heavy declines took place in the imports of cables and radio receivers and parts.

Argentina has long been experiencing difficulty in importing all the goods she needs.

Argentine supplies of raw and semi-manufactured materials for the Republic's small electrical manufacturing industry are referred to by the Canadian Commercial Attaché in Buenos Aires in a report to Ottawa. He says that import requirements of copper, bronze and brass manufactured goods are at present limited, since local industry, using copper ingots and bars imported from Chile, has devoted itself to the production of articles that before the war were imported. Nevertheless, it has not proved possible yet to solve certain technical difficulties in connection with the manufacture of some highly specialised products such as enamelled wire and small-gauge bare wire, which is of great importance in the manufacture and reconditioning of electric motors, etc.; for these articles Argentina is stated to be still dependent on imports.

The Commercial Attaché adds that to judge by the allocation assigned by the United States for the first quarter of 1943 it is almost certain that these requirements will not be covered and that some difficulties will arise if the problems encountered by local manufacturers of those articles are not overcome in the meantime.

The small export trade which Argentina has been building up in a few of the simpler types of electrical goods was maintained on the whole during last year, a drop in radio apparatus having been offset by better trade in some other articles.

Imports	1942 Thous. Pesos	Inc. or dec. on 1941 Thous. Pesos
Accumulator and battery parts	729	— 553
Batteries	11	— 51
Cells for batteries and accumulators	28	— 55
Ammeters and voltmeters	58	— 10
Bulbs for lamp and radio valve manufacture	439	— 137
Radio-telephone apparatus	441	+ 307
Receivers	896	— 1,532
Amplifiers	91	— 52
Loudspeakers (metal)	163	— 6
Radio parts	1,765	— 509
Telephones, without coils	52	+ 7
Telephones, with coils	186	— 27
Magneto telephones	54	— 80
Telephone materials	663	— 110
Telegraph materials	65	+ 7
Cookers, toasters, heaters, etc.	9	— 6
Switches, circuit-breakers, cut-outs, etc.	354	— 84
Vacuum cleaners	117	— 53
Electric bells	13	— 9
Insulating tape	18	— 14
Change-over switches	469	— 159
Incandescent lamps	684	— 53
Electric torches	2	— 90
Current meters	2,090	+ 509
Distribution boards	44	— 183
Insulating tubes	7	— 10
Other electrical goods	2,260	— 806
Dynamos and motors over ¼ HP	1,536	+ 23
Fan motors	79	+ 12
Motors under ¼ HP	56	— 44
Cable and wire, up to 5 mm., covered with cotton, rubber, etc.	332	— 308
Cable and wire, over 5 mm., covered with cotton, rubber, etc.	68	— 209
Cable and wire, up to 5 mm., lead-covered	210	— 95
Cable and wire, over 5 mm., lead-covered	19	— 802
Cable and wire, silk covered	49	— 51
Cable and wire, enamelled	143	— 188
Electrical flex	175	— 60
Telephone cables, underground, lead-covered and steel or iron armoured	320	— 2,860
Telephone cables, iron or steel, covered with cotton, gutta-percha, etc.	38	— 834
Accessories for underground cables	17	— 61
Insulators, glass	18	— 2
Insulators, porcelain	101	+ 3

Exports	1942 Thous. Pesos	Inc. or dec. on 1941 Thous. Pesos
Accumulators, batteries and parts	33	— 40
Telephone apparatus and parts	265	+ 180
Radio apparatus and parts	3,415	— 735
Lamps	406	+ 1
Other electrical goods	1,117	+ 432

In the R.N.V.R.

Experiences at a Naval Base

By "Selecto"

EARLY in 1940, I learned that there was a need for electrical engineers to assist in dealing with the magnetic-mine menace. I decided to make another attempt to join the Navy (I was turned down as a midshipman in 1914 on account of eyesight). After a surprisingly short interlude of form-filling and correspondence and a rather terrifying Selection Board, followed by a medical examination, I joined H.M.S. *Vernon* at Portsmouth. My uniform displayed the single wavy gold stripe of a probationary temporary sub-lieutenant with a green stripe immediately below denoting Special Branch. (The Electrical Branch did not then exist as a separate unit, but was formed later with a different shade of green and higher pay.)

Shortly after a fortnight's training I was appointed to an East Coast port, where a naval base was just coming into being, to find a real job of work awaiting me—that of producing a complete electrical maintenance organisation from nothing. I found an empty office without a piece of blotting paper, a workshop without even a screwdriver, three torpedo-men and a torpedo-gunner's mate (a petty officer specialising in electrical work).

The remainder of the men (of the newly created wireman branch) had been scrounged by various senior officers for messengers, watch-keepers and so on. The "repatriation" of these was the first task and proved to be no light one. For a sub. of two weeks seniority to explain to a commander that he *must* have his men back requires considerable nerve.

Unorthodox Procedure

Next came the equipment of the workshop with at least a few hand-tools, the negotiation of supplies and the rigging of a battery-charging station. No one, least of all myself, knew the correct procedure, so (as it was afterwards discovered) every established precedent was thrown overboard, and direct action was taken with the supply undertaking and tools and materials were bought direct from local ironmongers. This method at least brought results in the minimum of time, and the inevitable repercussions consequent upon such sublime ignorance did not arise until much later when I had eventually found my feet.

My third task, and most interesting of all, was to survey the actual job. As base electrical maintenance officer, I was responsible for everything electrical, from the captain's bell-push to the equipment of half a hundred trawlers, drifters and motor-boats, no two of which were alike. I also found myself facing the problem of the Scots engineer.

Scots engineers are a race apart. Born (it would almost seem) and reared in the engine-room of a fishing trawler, they are amongst the world's finest practical engineers, so far as steam machinery goes. Electricity, however, is a different matter—they thoroughly disapprove of it. The ultimate trouble is reached in arguments concerning their "deynamoos." To them, the "deynamoo" is the steam-engine which drives it. The gadget which twiddles round at the other end of the shaft might be a large outboard bearing, for all they appear to care.

Most of the vessels were old trawlers and drifters, straight from fishing, and fitted with the original dynamos, not in the best state of repair, and usually hopelessly overloaded. Governors, if not removed completely, usually did not work, and were, in any case, never used.

Centralised Control

The Scots engineer recognises one control only—the hand throttle. Some of the sets had field regulators which actually worked, but were never touched. Why should they worry about "yon wee knub" when they had what they regarded as a perfect voltage control on the steam pipe? (I once tried for two hours to explain to one of them that if he persisted in running at full field and reduced speed, *of course* his dynamo would get hot. Increased I^2R losses in the field and reduced ventilation meant absolutely nothing to him; all he cared about was nursing his steam-engine.)

Most of the engines were "nursed" by running at 85-90 volts. To convince them that some of their gadgets required within ± 5 per cent. of 110 V was impossible. Since 90 volts had always been good enough for fishing—what was the matter with it now? The throttle, incidentally, did duty as switch-gear as well. The switchboard was never touched. Why open switches which had only got to be closed again on starting up?

As they shut down as and when it pleased them, without warning the W/T operator, any batteries on charge would promptly discharge through the compounding coils of the generator, thus reversing the polarity. This often resulted in my being dragged from bed at 3 a.m. for a bumpy ride in a motor-boat to a trawler swaying and rolling in the North Sea swell. There, sweating and gasping in an oil-soaked and confined space (temperature about 120 deg. F.), I would put matters right and

return, with a sporting chance of being fired on by the shore batteries as a final thrill.

One of the most peculiar faults occurred on a converted yacht where, so the report went, "terrible things" happened every time the wireless batteries were put on charge, the generator "squeaking like a kicked puppy," while everything on the system went completely "haywire." On investigation I found that some grid resistors in series with the battery were shorted, with the result that a 12-V battery was being put across 110 V. Furthermore, the generator compounding coils were reversed, so that every time the overload occurred, the machine polarity reversed, with startling consequences.

"We're no' gettin' nae ootput frae yon deynamoo," was another complaint at 3 a.m. (the favourite hour for electrical machinery to give up the unequal struggle). "Och! Ah've tried they things" (the main fuses). After giving the wires protruding from the ends of the asbestos tube a smart tug and finding them apparently all right, I tried for continuity with a "Megger." Still O.K. The machine was stopped, and continuity tests carried out. After checking everything, the machine was started again, when a shock from the brushgear showed there was juice *somewhere*. A hastily rigged test lamp showed its presence as far as the main fuses. They *had* gone. The wire had aged, blown and welded itself to the tube in a pool of molten copper, strong enough to give the effect of a solid wire, and just low enough in resistance to show a zero reading.

Those days are no more. I am now in charge of a much larger base, ships at which were designed for the job and are not hasty conversions. Also I have now an adequate staff, and no longer have to try for a month to get a Sunday afternoon off. Dynamos are new and robust. Engineers now take an interest in their electrical gadgets. But I will never forget the fierce thrill of building a useful organisation out of nothing, under real difficulties (twice the workshop was entirely wrecked by bombs, necessitating a completely fresh start) with, for compensation, the help and companionship of the grandest bunch of men it has ever been my privilege to meet.

In the Courts

Claim for Work Done

ON October 26th and 27th, in the King's Bench Division, Mr. Justice Lewis had before him an action by the Utility Lamp & Fittings Co., Ltd., of Conway Street, London, W.1, against the Lawley Electric Storage Co., Ltd., of College Road, Kensal Rise, to recover the sum of £175 for work done and money expended in carrying out certain work for the defendants.

Plaintiffs' case was that Mr. R. R. Bergman, managing director of the plaintiff company, was asked by defendants to use his skill and experience in evolving a suitable long flat low beam for a landing lamp. Mr. Bergman contended that he submitted a suitable appliance and he now claimed his remuneration. Defendants agreed that plaintiffs were to submit such a lamp and reflector, but considered that £25 was sufficient remuneration.

His Lordship said he was satisfied that the plaintiffs' charges were too high, but he did not agree that the sum suggested by the defendants was sufficient. No arrangement had been made as to the price to be paid. He thought the plaintiffs' claim would be amply satisfied if he gave them £98 6s. 6d. He gave judgment for that amount with costs.

Overcharge for Adaptor

At the Greenwich Police Court recently Polchar's Wireless, Ltd., Catford, were fined £15, with five guineas costs, for overcharging for a lampholder adaptor. It was stated for the prosecution by Mr. Erskine Barrow that a purchaser was charged 2s. 3d. for the adaptor. When later he asked for a receipt the price was reduced to 1s. 9d. He found that this was more than was being charged elsewhere and reported the matter. Mr. Barrow said that before the war the wholesale price of a similar article was 4½d. and it could be sold for 7d. Now the wholesale price was 9d. and it was sold for 1s.

The argument for the defence was that a mistake had been made by an inexperienced assistant.

The prosecution said that in 1941 the company had been fined £40 for charging an excessive price for a torch battery.

The magistrate refused the company time to pay, saying that if the fine were not paid that day a distress warrant would be issued.

Unfenced Turbine Shaft

W. & A. W. Henderson, Ltd., Airthrey Paper Mills, Bridge of Allan, were fined £100 at Stirling on October 29th for a contravention of the Factories Act in that the turbine extension shaft in the generator house was not securely fenced, in consequence of which an employee suffered injury. A statement by an agent that guards were provided for the machinery under the supervision of a former H.M. Inspector of Factories, and that in the circumstances respondents were perhaps lulled into a sense of false security, was objected to by the present inspector, who quoted from a letter emphasising the necessity for the provision of efficient fencing to protect belts, pulleys, countershaft, and shaft extension in the power station.

Sheriff-substitute H. Burn Murdoch said this was a case of a clear contravention of the Act, which should not have occurred. The condition of the shaft extension was particularly notified to the respondents, who appeared to have done nothing about it. In view of this and also of the provision in the Act that the whole or any part of the fine might be applied to the benefit of the injured person or his family, he thought there was no reason to modify the statutory penalty of £100.

Fault kVA in Factories

Methods of Calculation on Lower-Voltage Systems

By D. T. Evans, A.M.I.E.E.

THE simplest method for calculating the short-circuit conditions with which a circuit-breaker must deal is to dispense with the vectorial addition of resistance and reactance components by ignoring resistance; this gives current values on the safe side, *i.e.*, slightly higher than if the resistance had been included. Where there are long lengths of cables and overhead lines, however, the resistance should be taken into account, as this causes a reduction in the calculated short-circuit current and possibly permits a saving in the cost of switchgear.

The percentage-reactance method of calculating the instantaneous symmetrical short-circuit current gives sufficiently accurate results for the majority of networks. Percentage reactance is the reactance-voltage drop per phase when the normal full-load current is passing, expressed as a percentage of the voltage to neutral. Thus a transformer has a 10 per cent. reactance if, when short-circuited, it has a reactive-voltage drop at normal load equal to 10 per cent. of the phase-to-neutral voltage; the short-circuit current would be ten times full-load current.

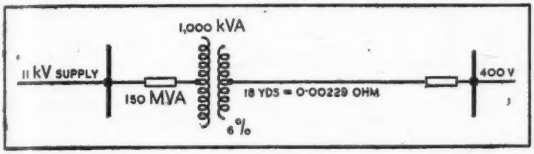


Fig. 1

When details of the high-voltage network are not available, the percentage impedance of that network may be obtained from the formula:—Per cent. impedance at kVA base $= \frac{\text{kVA base} \times 100}{\text{instantaneous MVA} \times 10^3}$, where the instantaneous MVA may be the known breaking capacity of the high-voltage switchgear.

Taking, for example, a 1,000-kVA, 11-kV/400-V transformer with a 6 per cent. reactance, where the 11-kV circuit-breaker has a breaking capacity of 150 MVA (fig. 1). The fault value on the 11-kV side of the transformer expressed as an equivalent percentage reactance on 1,000 kVA $= \frac{1{,}000 \times 100}{150 \times 10^3} = 0{\cdot}66$ per cent. Total reactance up to 400-V terminals of transformer $= 0{\cdot}66 + 6{\cdot}0 = 6{\cdot}66$ per cent. Short-circuit kVA $= \frac{1{,}000 \times 100}{6{\cdot}66} = 15{,}015$.

On lower-voltage systems the impedance of conductors must be allowed for as this can cause a considerable reduction in short-circuit values. Resistance values which are significant should not be ignored. The same applies to high-voltage systems with long cables and overhead lines.

The following example indicates the reduction in short-circuit kVA due to the addition of 18 yd. of 400-V cable comprising two 1·0 sq. in. single-core cables per phase. The spacing between phases is 9 in. and between cables of the same phase 3 in. This gives a reactance of 0·00229 ohm.

Since the reactance up to the 400-V terminals is 6·66 per cent., the reactance at given kVA base for ohmic value x $= \frac{100{,}000 \times \text{kVA base} \times x}{(\text{Voltage})^2}$. The percentage reactance of cable based on 1,000 kVA $= \frac{1{,}000 \times 0{\cdot}00229 \times 10^5}{400^2}$. Total reactance $= 6{\cdot}66 + 1{\cdot}43 = 8{\cdot}09$ per cent. Short-circuit kVA $= \frac{1{,}000 \times 100}{8{\cdot}09} = 12{,}237$. The resistance in this example is small enough to be ignored, but its effect could be calculated in a similar manner and added vectorially to the reactance.

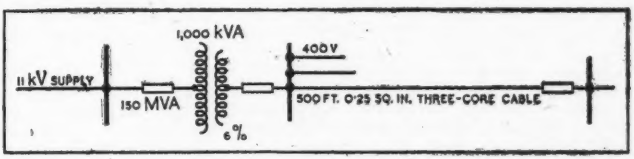


Fig. 2

An example of an auxiliary board fed from the main 400-V busbars (fig. 2) illustrates a case where the inclusion of the resistance in the calculations shows a con-

siderable reduction in the fault kVA. It must, therefore, be taken into account when determining breaking capacity. Again, the capacity of the transformer can conveniently be used as the kVA base for the purpose of the calculations.

Percentage reactance up to lower-voltage terminals of transformer = 6·66 per cent.; reactance of cable = 0·01 ohm. Percentage reactance of cable based on 1,000 kVA = $\frac{1{,}000 \times 0{\cdot}01 \times 10^5}{400^2}$ = 6·25 per cent. Total reactance = 6·66 + 6·25 = 12·91 per cent. Short-circuit kVA = $\frac{1{,}000 \times 100}{12{\cdot}91}$ = 7,746.

This figure does not take into account the resistance of the cable, so continuing the example:—Resistance of cable = 0·01623 ohm. Percentage resistance of cable = $\frac{1{,}000 \times 0{\cdot}01623 \times 10^5}{400^2}$ = 10·12. Total impedance = $\sqrt{12{\cdot}91^2 + 10{\cdot}12^2}$ = 16·4 per cent. Short-circuit kVA = $\frac{1{,}000 \times 100}{16{\cdot}4}$ = 6,097.

This example shows the serious error that may be introduced in determining short-circuit kVA on lower-voltage systems if conductor impedance is not taken into account.

If it had been ignored, the calculated short-circuit kVA would be 15,015 kVA as in the first example. Owing to the impedance of the cable, the short-circuit kVA is reduced by 40 per cent.

Road Safety at Night

Need for Uniformity in Illumination

By A. D. S. Atkinson
(E.L.M.A. Lighting Service Bureau)

MANY attempts have been made to assess the value of street lighting in terms of accident prevention. The following arguments may serve to stimulate discussion on a subject which will become urgent immediately hostilities cease, if not earlier. The data which follow are extracted from Road Accident Bulletin No. 14, published by the Royal Society for the Prevention of Accidents, but the conclusions reached are not the responsibility of that Society.

Table No. 2 in this Bulletin gives the monthly fatalities during the hours of daylight and darkness in peace (1936-7) and war (1939-41), but it gives no clear indication of the number or proportion of accidents which are attributable to the degree of blackness prevailing at night time. In an attempt to find these, it is suggested that the figures be worked out according to the following example (September, 1936-7) :—Number of accidents (from data) at night, 166 ; by day, 377 ; total night and day, 543. Approximate average of hours of daylight in September, 13¾ ; dark, 10¼ ; average accident rate per hour of daylight in September, 27·4.

Relative Traffic Densities

It is reasonable to assume that if there were daylight for the whole of the twenty-four hours, the frequency of accidents which occur during " night " would bear the same relation to the daytime accidents rate as the night traffic density does to the day. It is, however, necessary to make some assumption about the relative average traffic densities during daylight and dark, since no official figures have been found (" traffic " is here used to denote road users of all classes). Since it is unlikely that the average traffic density at night is more than 20 per cent. of the average daylight density, this figure is adopted. If it is on the high side the conclusions which can be drawn are all the stronger. Thus, estimated " night " accidents per hour, 20 per cent. of 27·4 = 5·48 ; total, 5·48 × 10¼ = 56 ; total number of accidents that would have occurred in September if daylight had lasted throughout the twenty-four hours = 56 + 377 = 433, whereas the number which actually did occur was 543.

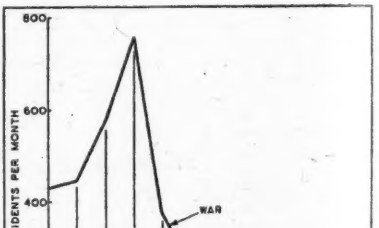


Fig. 1.—Effect of black-out and normal lighting on road safety

One may therefore be justified in concluding that the extra 110 accidents were very largely due to the difficulty of seeing by the street lighting and vehicle lighting provided before the war throughout the country as a whole. Certain other causes must obviously be borne in mind, such as fatigue and excessive indulgence in alcohol, which normally occur more frequently or more severely in the evening, but it would be extremely difficult to attempt to assign any definite number of accidents to these causes. Let us assume, therefore, that although the figure of 110 accidents may paint a rather gloomy picture, it still gives an indication of the true state of affairs.

If we now draw a curve worked out in the above way for each month of 1936-7, and a similar curve for the mean of the 1939-40 and 1940-41 data, we obtain fig. 1, the lower curve representing the accidents due to the difficulty of seeing in peacetime darkness, and the upper curve representing the same thing in war conditions.

Reinstatement of pre-war street lighting and vehicle lighting would approximately halve the monthly accidents due to darkness, *assuming equal traffic density now as compared with pre-war*. Actually, the scarcity of traffic nowadays would be likely to reduce accidents due to darkness to a figure well below the general peacetime level, but this of course would be only a temporary phase until the traffic density to which we became accustomed before the war was again reached.

Difficulty of Seeing

Further inspection of the data given in the Bulletin, and of figures derived from it, reveals that in 1936-7 with peacetime lighting, the accidents due to darkness (worked out on the above basis) totalled some 73 per cent. of all night accidents, whereas in 1939-41 the black-out accidents due to darkness (on the same basis) totalled 78 per cent. of all night accidents. If no fundamental error has been made, it appears that the *difficulty of seeing at night in peacetime is responsible for the same proportion of night accidents as the difficulty of seeing in the black-out*. Yet we know by common sense and common experience that one could see better in a well-lighted street than in a blacked-out one, and if proof were needed the accident statistics for the Victoria Embankment in 1928 and 1930 (after street lighting had been improved) will provide it (fig. 2). How then can these apparently conflicting results be reconciled?

Here again there are several causes which may contribute in minor degree. One of them perhaps is the growing proportion of vehicles with left-hand drive which cannot give proper signals, but by far the most weighty reason must surely be that the excellent visibility on *some* of the roads in the country was almost entirely negatived by the confusion caused by the constant and wide variation of illumination from road to road and even on parts of the same road. In time, one might almost get used to walking or driving in the black-out with the very dim aids to vision which are now allowed, but one could never get used to driving at one instant along a road lighted according to the M.O.T. Report and at the next instant along a side street or residential road with lighting of a very low order.

Nobody will deny that good street lighting *where it is present* is a valuable safety device, but it appears that good street lighting reduces accidents only in well-lighted areas at the expense of more numerous accidents in poorly lighted or unlighted areas. Thus the full value of lighting will not be obtained until it is both ubiquitous and more uniform. And can we be really satisfied even with good pre-war street lighting practice, so far as quantity of light is concerned? In factories, the law demands a *minimum* of 0·5 ft.-candle illumination for safety purposes in corridors and stairways; but on main traffic routes Class C lighting was not usually considered inadequate, though the speed of movement on the road is higher than in a corridor. In other words, are we yet considering putting a high enough cash value on human life and limb on the roads?

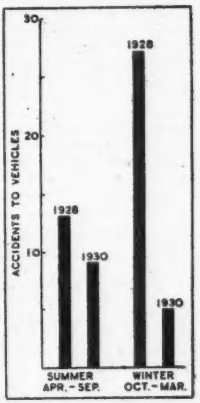


Fig. 2.—Result of improvement in lighting on driving conditions (Victoria Embankment)

Expedients Must be Temporary

When at last the lights go up again most people are not going to be too particular about the sort of light it is, so long as it is there at all. Public lighting engineers will doubtless do miracles of restoration and repair, and we can expect much of the pre-war street lighting to function at the earliest moment allowed. But there will inevitably be many areas where the old lanterns and standards are no longer in working order, if indeed they exist at all, and here we may perhaps see some weird and wonderful examples of temporary lighting. Few will complain about that, for it all adds to the fun; but let us be sure that what is erected as a temporary expedient really *is* temporary, and is not allowed to become a permanent feature.

ELECTRICITY SUPPLY

Street-Lighting Discussions.

Dundee.—POST-WAR LIGHTING.—For the resumption of public lighting after the war the Lighting Sub-Committee at its last meeting authorised the lighting inspector to order materials to the value of £1,263. A proposal that a revised system of stair lighting should be considered was remitted to the Lighting Committee.

Edinburgh.—DECISION AGAINST "STARLIGHTING."—Following the relaxation of the ban on modified lighting in the city the Council on October 28th discussed a recommendation of the Streets and Buildings Committee that the system should be installed in a central area at a cost of £2,000. Objectors to the scheme described it as a waste of public money, while supporters of the proposal claimed for Edinburgh the advantages of London, Glasgow, Birmingham, and other places, and asked whether the cost in lives and injuries in the black-out had been measured. By 25 votes to 23 the proposal for "starlighting" was rejected.

London.—LIGHTING SIDE STREETS.—Battersea Highways Committee has considered the possibility of extending the wartime system of lighting to the side streets, in which there are 1,920 lamps. It is estimated that the cost of converting the existing lamps would amount to £1,952 and that there would be an increased annual charge of £2,264. It is pointed out that the supply position, both as regards labour and materials, is such that it would be several months before any change-over could be effected, and also that further expenditure and possible delay would occur in changing back to peacetime fittings after the war.

Lytham St. Annes.—PUBLIC LIGHTING.—As part of a post-war programme the Corporation is considering a suggestion that the streets should be relighted by electricity.

Manchester.—SUPPLY TO FARM.—The Electricity Committee has given permission to the Alderley Edge and Wilmslow Electricity Board to supply electricity to a farm at Moss Nook, in the Corporation area of supply.

MODEL HOUSE.—A proposal for the exhibition of a model house at the electricity showrooms is being discussed with the Housing Committee.

SUBURBAN LIGHTING.—The Highways Committee has approved a first list of 96 suburban streets in which it is proposed to install modified lighting. For these streets 384 lamps are required.

SUBSTATION EXTENSION. — The Electricity Committee is to extend a substation for the purpose of maintaining the voltage of the supply for the trolley-bus service in New Moston.

Mountain Ash.—"CHRISTMAS BOX" REPEATED.—Discounts which mean a gift to electricity consumers of about £4,500 were announced by Councillor W. J. Price, chairman of the Municipal Undertakings' Committee, at the last meeting of the Urban District Council. He said that the special tariff for the December quarter in past years had always been received with satisfaction. Last year a new record was achieved and it was not believed that it could be repeated. However, notwithstanding the exceptional charges for December, 1942, they were able last year to increase their reserve fund by no less than £2,500. In fact, it seemed that the more they returned to consumers, the stronger their financial position became. During the last financial year they had realised a part of their reserve fund investments and made a profit of over £1,000 on the transaction. Unless something unexpected happened they would have a reserve fund of £30,000 at March 31st next. They had discharged their loan debt years ago.

Councillor S. Blake said that apart from providing another magnificent "Christmas box" Mr. E. W. Jones, the electrical engineer, was doing all he could to secure supplies of equipment for local consumers despite war conditions.

The discounts, as before, are in the form of reduced kWh charges and, like last year, embody a "step-up" characteristic. Thus the charge for the first 100 kWh for lighting for the quarter is ½d. per kWh and thereafter 1d. Under the two-part tariff ½d. per kWh is charged for the first 100 kWh and ¾d. per kWh for additional consumption.

Mountain Ash "Present."

Penmaenmawr.—MODIFIED LIGHTING.—The Electricity Committee is to erect experimental lamps for "starlighting" in Pantyrafon.

Scarborough.—LOANS.—The Electricity Committee has obtained sanction to borrow £1,200 for substation equipment and is seeking sanction to borrow £1,618 for switchgear modifications.

Scotland.—QUALIFICATIONS OF CHAIRMAN—In the House of Commons last week Mr. McNeil asked the Secretary of State for Scotland what qualifications for appointment as chairman of the Hydro-Electric Board were possessed by the Earl of Airlie, and what experience he had had in industry in general and hydro-electricity in particular. Mr. Johnston replied that the chairman of the Board was invited to serve because of his wide administrative experience which included the posts of chairman of the Scottish Agricultural Wages Board, chairman of the British Legion in Scotland and Deputy Regional Commissioner of Civil Defence in Scotland. In all these he had served with conspicuous ability.

Stockport.—STREET LIGHTING.—The Electricity Committee is to extend modified streelighting by the installation of 100 additional fittings.

Wood Green. — STREET LIGHTING. — The borough engineer recently submitted to the Highways Committee quotations from the Tottenham and District Gas Co. and the Northmet Power Co. for the provision of modified street lighting throughout the borough. The capital cost of the scheme was estimated at £2,337 (£1,815 for gas lamps and £562 for electric lamps) and the annual lighting cost would be £3,518 (1,302 gas lamps, £2,997, subject to a price-variation clause; and 343 electric lamps, £521). It was stated that communications had been received from various local bodies urging the adoption of modified

lighting. The Committee recommended that as an experiment lighting should be provided on the Noel Park Estate, with 45 lamps at a capital cost of £62 and an annual maintenance charge of £107.

Overseas

Italy.—ELECTRICITY IN NAPLES.—It was reported this week that an electricity supply had been restored in parts of Naples. As the main city power station had been wrecked, the supply has had to be obtained from outside. Power is being restored area by area and in each case the population is temporarily evacuated to avoid risk to life in the event of concealed mines being connected to the circuits. Since the occupation of the city the dynamos of Italian submarines in the harbour have been used to provide light for urgent work in the dockyard.

TRANSPORT

Edinburgh.—RAILWAY ELECTRIFICATION PROPOSAL.—Substitution of electric for steam trains on the suburban and other lines within the city boundaries is among the suggestions made by the Advisory Committee for the Development of Edinburgh whose report has just been published.

Manchester.—EXTENSION OF TIME.—The Transport Committee is seeking an Order to extend for a further period of three years the time-limit for the commencement of trolley-vehicle operation in Wythenshawe and Trafford Park.

Newcastle-on-Tyne.—TROLLEY-BUS EXTENSIONS.—The City Council has approved a recommendation of the Transport and Electricity Committee to apply to the Ministry of War Transport for a Provisional Order for extending the trolley-bus service into Gateshead. The plan covers four routes. The first is from Pilgrim Street over the Tyne Bridge to a terminus in High Street, Gateshead; the second route is from High Street along Hill Street, Gateshead; the third route is from St. Nicholas Street, Newcastle over the High Level Bridge and along Wellington Street, Gateshead; and the fourth route is from Percy Street, Newcastle, along Newgate Street, and the Bigg Market to St. Nicholas Street. The routes are at present served by trams. At a meeting of the City Council it was explained that there was no immediate hurry to bring about the change-over, but the granting of the Provisional Order would safeguard the Council's interests.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

Crabtree Electrical Industries, Ltd., in a preliminary statement, reports that the trading profit of J. A. Crabtree & Co., the operating company, for the past year was £244,272, against £225,727. After providing for E.P.T. and deferred repairs, however, the net profit was only £53,305, as compared with £111,390. The holding company's dividend is maintained at 17½ per cent. for the year by a final distribution of 5 per cent. plus a cash bonus of 7½ per cent.

Erinoid, Ltd.—In the course of his speech at the annual meeting held on October 28th, Mr. W. G. Waldron, chairman, said that it was a long time now since the company operated only the original casein material. To-day they produced four basic raw materials and a number of their offshoots. Research work, both long and short-term, was being continually carried out in order to improve their established materials and to ensure that they kept ahead in the development of modern plastics. The newer products would not necessarily displace the old ones, but would be complementary to them.

The Nigerian Electricity Supply Corporation, Ltd., held its annual meeting on October 26th, at which Major E. Seaborn Marks (chairman and managing director) presided. In his review of the past year which was circulated with the report and accounts, the chairman says that after months of representation to the Treasury, it has now been agreed that, for taxation purposes, the Corporation is to be treated on the same basis as the Nigerian tin mines. This ruling improves the company's tax position. It has been decided to redeem £66,778 of the outstanding debenture stock on June 30th, 1944, which will reduce the amount outstanding to under £150,000. Owing to the big demand for power and the lateness of the rainy season this year, the water supply was nearing exhaustion, and the company was obliged to ration consumers. This reduced the tin output and the Government decided, at its own cost to build a dam on the Tenti River in part of the catchment area, to conserve 300 million cu. ft. of water for use in dry seasons. This work is now well advanced.

The Jerusalem Electric & Public Service Corporation, Ltd., held its annual meeting on October 27th, when Mr. W. Shearer (chairman) said that the satisfactory progress made in the previous year had been more than maintained. A steady increase in consumers had taken place and the gross revenue had increased by 15·6 per cent. over that for the previous year, the kWh sold being up by 20 per cent. It must be borne in mind, however, that certain supplies of electricity now being given might be curtailed or discontinued after the war.

Operating costs continued to increase, partly due to the additional consumption of fuel oil and expenses which followed extra demand on their system, and partly because of increases in salaries and wages. The whole of the plant had operated satisfactorily during the year, both station and distribution efficiency having shown improvement.

The state of partial isolation of Palestine due to the war had introduced certain difficulties in the maintenance of plant and equipment, and had increased its costs. Resort to improvisation, however, and the use of locally-produced material had enabled their engineers to keep the plant in serviceable condition.

They anticipated that with the easing of conditions in the Mediterranean they would be able to obtain spares and materials more expeditiously.

Aron Electricity Meter, Ltd., announces that after meeting taxation and contingencies the profit for 1942-43 was £20,222 (against £15,358). General reserve again receives £5,000 and the dividend is raised from 10 to 15 per cent., leaving £14,710 (against £10,853) to be carried forward. During the year the factory was fully occupied. No provision has been made for E.P.T. as the profit was below the standard.

J. & F. Stone Lighting & Radio, Ltd., proposes to pay a dividend of 6 per cent., less tax, for the year ended June 30th. For the previous year 5 per cent., less tax, was paid.

The Ever Ready Co. (Great Britain), Ltd., is again paying an interim ordinary dividend of 15 per cent.

The Anglo-Portugese Telephone Co., Ltd., is paying an unchanged interim dividend of 3 per cent.

Meters, Ltd., has declared an interim dividend of 4 per cent. on its ordinary shares (same).

Ferranti, Ltd., announce a dividend of 6 per cent., free of tax, for the past year, as for the preceding year.

Drake & Gorham, Ltd., are again paying a dividend of 5 per cent. for the year.

The Calcutta Tramways Co., Ltd., is maintaining its interim dividend at 2½ per cent.

Ebonite Container, Ltd., has declared an interim dividend of 5 per cent.

Glenfield & Kennedy, Ltd., are paying an interim dividend of 5 per cent., as last year.

New Companies

Powersales, Ltd.—Private company. Regis-gistered October 23rd. Capital, £100. Objects: To carry on the business of electricians, electrical and mechanical engineers, etc. Directors: A. A. C. Degen, 27, Headstone Gardens, Harrow, T. B. Glynne-Williams, 21, Palace Court, W.2 (chairman) and J. Hynes-O'Neill, 3, Everley Crescent, Ruislip, Middlesex. Solicitors: Swepstones, Dashwood House, E.C.

Wireless (Nottingham), Ltd.—Private company. Registered October 23rd. Capital, £500. Objects: To carry on the business of radio manufacturers, repairers and dealers, etc. Directors: D. F. Ryder, 35, Roslyn Avenue, Gedling, Notts and N. H. Allport, 13, Charlton Street, Nottingham. Registered office: 21, Goose Gate, Nottingham.

Dennis O. C. Littler & Co., Ltd.—Private company. Registered October 16th. Capital, £3,000. Objects: To acquire the business of a general merchant and electrical wholesaler carried on by Dennis O. C. Littler at Cheltenham. Directors: D. O. C. Littler, 23, Imperial Square, Cheltenham and A. J. Zeal, 2, Pittville House, Pittville Park, Cheltenham. Registered office: 31, John Street, Bedford Row, W.C.1.

Radiowave, Ltd.—Private company. Registered October 6. Capital, £100. Objects: To carry on the business of mechanical, electrical, radio and chemical engineers, manufacturers of wireless, scientific, industrial and domestic apparatus, etc. Directors: J. R. Amphlett, 2, Hare Court, Temple, E.C.4, and Mrs. J. E. M. Clancey, 79, Hartland Road, N.W.6. Registered office: 231, Strand, W.C.2.

Companies' Returns

Statements of Capital

Brush Electrical Engineering Co., Ltd.—Capital, £1,500,000 in £391,489 preference stock £1 units. £654,120 ordinary stock 5s. units and 68,902 ordinary shares and 384,789 unclassified shares of £1 each. Return dated June 1st. £391,489 preference stock and £654,820 ordinary stock taken up. £660,015 5s. paid. £386,293 15s. considered as paid. Mortgages and charges: £602,768.

Chamberlain & Hookham, Ltd.—Capital, £100,000 in £5 shares (10,500 ordinary and 9,500 preference). Return dated July 21st. 10,100 ordinary and 8,000 preference shares taken up. £36,990 paid. 53,510 considered as paid. Mortgages and charges: Nil.

Mirrlees, Bickerton & Day, Ltd.—Capital, £600,000 in £1 shares (100,000 5½ per cent. preference and 500,000 ordinary). Return dated August 3rd. 71,000 preference and 466,000 ordinary shares taken up. £302,500 paid. £234,500 considered as paid. Mortgages and charges: Nil.

Salisbury Electric Light & Supply Co., Ltd.—Capital, £125,000 in £1 shares. Return dated April 28th (filed July 8th). All shares taken up. £122,500 paid. £2,500 considered as paid. Mortgages and charges: £15,700.

Marconi Sounding Device Co., Ltd.—Capital, £75,000 in £1 shares. Return dated June 7th. All shares taken up. £75,000 paid. Mortgages and charges: Nil.

Mortgages and Charges

New Process Welders, Ltd.—Assignment on October 8th, 1943, of proceeds of contract, to secure all moneys due or to become due from the company to Barclays Bank, Ltd.

Frank Watson (Croydon), Ltd.—Satisfaction to the extent of £250 on June 29th, 1943, of debenture No. 5, issued September 2nd, 1942, and registered September 14th, 1942.

Bankruptcies

C. G. Merrison, radio dealer, 61b, Raleigh Street, Walsall.—Application for discharge to be heard on December 2nd at the Court House, Walsall.

J. V. Reynolds (British Electrical Installations Co.), electrical engineer, 7, Lambs Conduit Street, London, W.C.1.—Trustee, Mr. S. Jackson, Kent House, Telegraph Street, London, E.C.2, released October 12th, 1943.

A. Lawrie (Houchin & Lawrie), electrical engineer, 9, Melbourne Parade, Palmers Green, Middlesex.—Order made October 1st, 1943, suspending discharge for two months until December 1st, 1943.

T. Johnson, electrician, 233, The Wheel, Ecclesfield, Yorks, lately carrying on business at 25, Granville Street, Sheffield, as Tom Johnson & Co.—Trustee, Mr. A. H. Ward, 55, Queen Street, Sheffield, released October 26th, 1943.

STOCKS AND SHARES

TUESDAY EVENING.

THE conduct of the Stock Exchange markets and prices suggests that a halt has been called to the rising tendency of the past few months. It is difficult to assign any specific reason for the setback in a number of the markets where, previously, there was no apparent limit to the capacity of the public for the absorption of whatever stock came in. For this state of affairs there has been substituted a cautious attitude on the part of the usual buyers. Therefore, the automatic selling, which daily arises through realisation of deceased estates and similar causes, exerts a greater effect than it would do if there were the normal measure of support opposed to it.

In the meantime, while buyers are holding their hands, money is accumulating and, in the ordinary course of events, will flow into the Stock Exchange markets when the turn comes for capital to overcome its present coyness. Then it will again look for Stock Exchange securities in which to employ resources that can be spared from subscription to national war borrowing. A general and substantial rise in Home Railway junior stocks is indicative of public readiness to invest money when attraction is offered.

Home Railways Harden

Home Railway stocks have taken on a bright appearance by reason of an important statement made by Lord Leathers, the Minister of Transport, in the House of Lords last week. He supported the cause of the Home Railway companies, saying that the Government cannot allow such a vital service to be starved of proper maintenance and improvements owing to shortage of funds, or inability to raise new capital. He went on to declare that the credit of the Government is behind the railways, and that conditions must be created by which the railway companies can operate on a reasonable profit margin. This brought about a considerable improvement in the junior class of the Home Railway companies. Southern Railway issues advanced, London Passenger Transport " C " stock held its rise to 69.

The Tendency of Markets

The disposition of prices of ordinary shares in front-rank industrial companies leans, for the time being, to the lower side. Changes in prices are of little significance save that they point to a growing attitude of caution on the part of investment. Some people think that, when the news suggests a fairly early conclusion to the war, this is a sign that the time approaches for present-day values to come down, in view of the scramble for money which will take place after the war. Those who challenge this theory do so on the ground that for years to come the Government will be compelled to maintain its cheap money programme, and that, as the natural sequel, share prices will keep comparatively high, with yields relatively modest. Between the two sets of opinion the gulf is sufficiently wide to allow room for buying and selling according to the view which the observer takes of the prospects.

Price Fluctuations

The falls are, however, of no great importance. General Electrics at 4½ and Johnson & Phillips at 68s. 6d. have lost 1s. Henley's are 6d. down at 24s. 9d., as also are Siemens at 34s. 3d., Hall Telephones at 25s. 3d. and British Vacuum Cleaner at 27s. British Insulated maintain their recent gain at 5½. Callender's failed to recover last week's decline to 98s. 9d. At 39s. 6d., Ever Ready shares are unaffected by repetition of the usual interim dividend of 15 per cent. That the final will make up 40 per cent. for the year, as before, is generally assumed. Prices of shares in the " heavy " industry are less firm; Vickers have gone back to 18s., a fall of 6d. Babcock & Wilcox, allowing for the dividend deduction, are unchanged at 48s. x.d. Ransome & Marles show a small loss at 82s. Ruston & Hornsby are changing hands at 44s. 6d. Ward & Goldstone are 3d. better at 26s. 3d. Business has been done in Manchester at 26s. 6d.

Radio shares have fallen out of favour. E.M.I. shed 9d., going back to 25s. 3d. A little selling of Cossors sufficed to depress the price by 1s. 6d. to 25s. Pye deferred hold their ground at 25s., but the market is dull as a whole, from want of public notice.

Murex

Murex went back 6s. 3d. to 95s. upon publication of accounts showing the profits for the year to have fallen by £109,000 as compared with the previous twelvemonth. The dividend and bonus are 20 per cent., the same as before. The decrease in trading profit is explained as being partly due to the cessation of supplies of certain raw materials from territory now in enemy occupation, and partly to the lower margin of profit on other essential commodities. Murex occupies so strong a position financially that the decrease in the profit, while considerable, is not likely to shake the confidence of shareholders in the company.

Cable & Wireless

Notwithstanding the investment demand that persists for industrial stocks and shares giving a return of 5 per cent. or thereabouts on the money, Cable & Wireless ordinary stock continues to be a dull market. The preference has hardened to 110, at which

(*Continued on page* 627)

ELECTRICAL INVESTMENTS

Prices, Dividends and Yields

Company	Dividend Previous	Dividend Last	Middle Price Nov. 2	Rise or Fall	Yield p.c. £	s.	d.
Home Electricity Companies							
Bournemouth and Poole	12½	12½	61/-	..	4	1	2
British Power and Light	6	7	32/6	..	4	4	9
City of London	7	7	28/-	..	5	0	0
Clyde Valley	8	8	39/6	..	4	1	0
County of London	8	8	40/6	..	3	19	0
Edmundsons:							
7% Pref.	7	7	32/9	..	4	5	6
Ord.	6	6	28/6	..	4	4	3
Elec.Dis.Yorkshire	9	9	44/-	..	4	1	10
Elec. Fin. and Securities	12½	12½	53/6	..	4	13	4
Elec. Supply Corporation	10	10	46/-	..	4	7	0
Isle of Thanet	Nil	Nil	18/-	..		—	
Lancs. Light and Power	7½	7½	34/6	..	4	7	0
Llanelly Elec.	5½	6	25/6	..	4	14	1
Lond.Assoc.Electric	4	3	23/-	—6d.	2	12	2
London Electric	6	6	27/6	..	4	7	3
LondonPowerRed. Deb.	5	5	103½	..	4	16	7
Metropolitan E.S.	8	8	41/-	..	3	18	0
Midland Counties	8	8	39/-	..	4	2	0
Mid. Elec. Power	9	9	42/6	..	4	4	9
Newcastle Elec.	7	7	31/-	..	4	10	5
North Eastern Elec.:							
Ordinary	7	7	32/6	..	4	16	2
7% Pref.	7	7	33/6	..	4	3	7
Northampton	10	10	47/6	..	4	4	0
Notting Hill 6% Pref. (£10)	6	Nil	10	..		—	
Northmet Power:							
Ordinary	7	7	38/-	..	3	13	8
6% Pref.	6	6	29/6	..	4	0	0
Richmond Elec.	6	6	26/-	..	4	12	4
Scottish Power	8	8	38/6	..	4	4	4
Southern Areas	5	5	22/-	..	4	10	11
South London	7	7	26/6	..	5	5	8
West Devon	5	5	23/6	..	4	5	0
West Glos.	4½	3½	24/-	..	2	18	4
Yorkshire Elec.	8	8	41/-	..	3	18	0
Overseas Electricity Companies							
Atlas Elec.	Nil	Nil	7/-	—3d.		—	
Calcutta Elec.	7*	6*	37/6	..	3	4	0
Cawnpore Elec.	10	10	35/6	..	5	12	8
East African Power	7	7	33/6	..	4	3	7
Jerusalem Elec.	7	5	28/-	..	3	11	5
Kalgoorlie (10/-)	5	5	10/-	..	5	0	0
Madras Elec.	4*	Nil	22/6	..		—	
Montreal Power	1½	1½	20½	—1½	7	6	4
Palestine Elec."A"	4*	5*	41/-	..	2	8	10
Perak Hydro-elec.	6	7	13/6	..		—	
Shawinigan Power	83cts.	90cts.	16xd	—1		—	
Tokyo Elec. 6%	6	6	22	..		—	
VictoriaFallsPower	15	15	4 4/12	..	3	9	7
Whitehall Inv.Pref.	—	—	25/-	..	4	0	0

Company	Dividend Previous	Dividend Last	Middle Price Nov. 2	Rise or Fall	Yield p.c. £	s.	d.
Public Boards							
Central Electricity:							
1955–60 (Civil Defence)	—	3	99½	..	3	0	4
1955–75	5	5	113½	..	4	8	0
1951–73	4½	4½	107	..	4	4	1
1963–93	3½	3½	102	..	3	8	8
1974–94	3½	3½	98½	..	3	6	0
LondonElec.Trans. Ltd.	2½	2½	97	..	2	11	3
London & Home Counties 1955–75	4½	4½	111	..	4	1	1
Lond.Pass.Trans.:							
A	4½	4½	116½	+1	3	17	3
B	5	5	116½	..	4	5	10
C	2½	3	69	..	4	7	0
WestMidlandsJ.E.A. 1948–68	5	5	109	..	4	11	9
Telegraph and Telephone							
Anglo-Am. Tel.:							
Pref.	6	6	115½	..	5	4	0
Def.	1½	1½	27½	..	5	9	1
Anglo-Portuguese	8	8	24/-	..	6	13	4
Cable & Wireless:							
5½ Pref.	5½	5½	110	+½	5	0	0
Ord.	4	4	76	—1½	5	5	3
CanadianMarconi$1	Nil	4cts.	9/-	..		—	
Globe Tel. & Tel.:							
Ord.	8½*	5*	37/-	—1/-	2	14	0
Pref.	6	6	29/-	..	4	2	9
Great NorthernTel. (£10)	Nil	Nil	23½	..		—	
Inter. Tel. & Tel.	Nil	Nil	16	..		—	
Marconi-Marine	7½	7½	32/9	..	4	11	7
Oriental Tel. Ord.	16	10	45/6	..		—	
Telephone Props.	6	Nil	17/-	+1/-		—	
Tele.Rentals(5/-)	10	10	10/9	+3d.	4	13	0
Traction and Transport							
Anglo-Arg.Trans.:							
First Pref. (£5)	Nil	Nil	3/6	..		—	
4% Inc.	Nil	Nil	10	—1		—	
Brit.Elec.Traction:							
Def. Ord.	45	45	1095	—10	4	2	2
Pref. Ord.	8	8	175	..	4	11	5
Bristol Trams	10	10	52/-	..	3	17	0
Brazil Traction	$1	$1⅛	28½	—⅛		—	
Calcutta Trams.	5½	6½	40/-	—6d.	3	5	0
Cape Elec. Trams	5	6	24/-	..	5	0	0
Lancs.Transport	10	10	44/3	..	4	10	4
Mexican Light:							
1st Bonds	5	5	110½	..	4	10	6
Rio 5% Bonds	5	5	107½	..	4	13	0
Southern Rly.:							
5% Prefd.	5	5	77	+½	6	9	10
5% Pref.	5	5	112	+½	4	9	3
T. Tilling	10	10	57/-	—1/-	3	10	2
West Riding	10	10	43/-	..	4	13	0

(*Continued on next page*)

* Dividends are paid free of Income Tax.

Company	Dividend Previous	Dividend Last	Middle Price Nov. 2	Rise or Fall	Yield p.c. £ s. d.
Equipment and Manufacturing					
Aron. Elec. Ord. .	10	15	55/–	..	5 9 1
Assoc. Elec. :					
Ord.	10	10	50/–	–6d.	4 0 0
Pref.	8	8	39/–	..	4 2 1
AutomaticTel.&Tel.	12½	12½	59/6	..	4 4 0
Babcock & Wilcox	11	11	48/–xd	..	4 11 7
British Aluminium	10	10	47/–	..	4 5 1
British Insul. Ord.	20	20	5⅛	..	3 14 4
British Thermostat (5/–)	18½	18½	19/–	..	4 17 4
BritishVac.Cleaner (5/–)	15	30	27/–	–6d.	5 11 1
Brush Ord. (5/–)	6	8	9/3	..	4 6 6
Burco (5/–) ..	15	15	16/–	..	4 13 9
Callender's ..	15	20	98/9	..	4 1 0
ChlorideElec.Storage	15	15	82/6	..	3 13 0
Cole, E. K. (5/–)	7	10	25/–	–1/6	2 0 0
Consolidated Signal	17	24	5¾	..	4 3 6
Cossor, A. C. (5/–)	7½*	10*	23/6	..	2 2 6
Crabtree (10/–) ..	17½	17½	39/9	..	4 8 0
Crompton Parkinson Ord. (5/–) ..	20	20	26/–	..	3 17 0
E.M.I. (10/–) ..	6	8	25/3	–9d.	3 3 7
Elec.Construction	10	12½	51/3	..	4 17 6
Enfield Cable Ord.	12½	12½	58/–	..	4 6 2
English Electric..	10	10	48/–	..	4 3 4
EnsignLamps(5/–)	25	25	22/6	..	5 11 1
Ericsson Tel. (5/–)	22*	20*	51/6xd	..	1 18 10
Ever Ready (5/–)	40	40	39/6	..	5 1 3
Falk Stadelmann	7½	7½	32/–	..	4 13 9
Ferranti Pref. ..	7	7	29/6	..	4 15 0
G.E.C. : Pref. ..	6½	6½	32/–	..	4 1 3
,, Ord. ..	17½	17½	90/–	–1/–	3 17 9
Greenwood&Batley	15	15	42/6	..	7 1 2
HallTelephone(10/–)	12½	12½	25/3	–6d.	4 19 0
Henley's (5/–) ..	20	20	24/9	–6d.	4 0 10
4½% Pref. ..	4½	4½	23/–	..	3 18 3
Hopkinsons ..	15	17½	62/–	..	5 13 0
India Rubber Pref.	5½	5½	21/6	..	5 2 4
Intl. Combustion	30	30	6¼	..	4 16 0
Johnson & Phillips	15	15	68/6	–1/–	4 7 7
LancashireDynamo	20	22½	92/9	..	4 17 0
Laurence,Scott(5/–)	15	12½	11/6	..	5 8 8
London Elec. Wire	7½	7½	32/6	..	4 12 3
Mather & Platt ..	10	10	51/3	..	3 18 9
Metal Industries(B)	5	8	45/–	..	3 11 2
Met.Elec.CablePref.	5½	5½	21/3	..	5 3 6
Murex	20	20	4¼	–⅛	4 4 2
Pye Deferred (5/–)	25	25	25/–	..	5 0 0
Revo (10/–) ..	17½	17½	40/–	..	4 7 6
Reyrolle ..	12½	12½	70/–	..	3 11 5
Siemens Ord. ..	7½	7½	34/3	–6d.	4 7 7
Strand Elec. (5/–)	7½	10	7/9xd	+3d.	6 9 0
Switchgear&Cowans (5/–) ..	10	20	18/–	..	5 11 1
T.C.C. (10/–) ..	5	5	20/–	..	2 10 0
T.C. & M. ..	10	10	53/–	..	3 15 6
TelephoneMfg.(5/–)	9	9	11/6	..	3 18 3
Thorn Elec. (5/–)	20	20	21/9	..	4 12 0
Tube Investments	20	20	92/6	–6d.	4 6 7
Vactric (5/–) ..	Nil	Nil	13/6	..	—
Vickers (10/–) ..	10	10	18/–	–6d.	5 11 1
WalsallConduits(4/–)	55	55	45/–	..	4 17 9
Ward & Goldstone (5/–)	20	20	26/3	+3d.	3 16 2
WestinghouseBrake	10	12½	67/3	..	3 14 1
West, Allen (5/–)	7½	7½	7/–	..	5 7 2

* Dividends are paid free of Income Tax.

Stocks and Shares (*Continued from page* 625)

the return comes to 5 per cent., but the ordinary, showing a fall of 1½ to 76, gives 5½ per cent. It is suggested in the Stock Exchange market that the heaviness of the stocks may be due in some measure to a misapprehension. A recent speech made in the United States suggested that after the war it would be a good thing for American cable and communication companies to combine, in the same way as has been done over here through the medium of Cable & Wireless. Some people seem to have read into this statement a threat of future competition.

Considering, however, that the main interests of Cable & Wireless lie in the East, competition is not likely in any case to assume serious proportions, although Cable & Wireless is, of course, concerned in transatlantic business through its holding of Marconi, shares, Canadian Marconis and others.

The preference stock may be accounted a useful mixer to put with others that pay a lower rate of return, while the ordinary has attractions as a post-war proposition, and giving at the present time a reasonable yield on money invested in it. Globe Telegraph ordinary at 37s. are 1s. lower.

Miscellaneous Matters

The prices of Canadian utility issues are unable to shake themselves free from the malinfluence of the proposals to expropriate the Montreal Light & Power undertaking. The shares of the latter are 1½ down at 20½, a drop of nearly ten dollars in six weeks. Shawinigan Power shares are 1 lower at 16 ex dividend. Amongst other dollar stocks, Brazilian Tractions are ¾ down at 28½, the price having steadily fallen since the dividend was raised. Calculation of the yield which the shares afford to a British investor is a complicated business, but a Stock Exchange dealer in the shares has worked out the return to approximately 6½ per cent. on the money at 29. In the Indian section, Calcutta Trams at 40s. are 6d. down. Of the British transport stocks, B.E.T. deferred at 1095 shows a drop of 10. Telephone Properties have risen 1s. to 17s. on renewed hopes of a resumption of dividends on the shares, which have gone without any return since May, 1940.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

AUTOMATIC Telephone & Electric Co., Ltd., and G. T. Baker.—"Telephone systems." 4649. April 9th, 1942. (556612.)

Belliss & Morcom, Ltd., and A. A. Jude.—"Governors for prime movers." 3901. March 24th, 1942. (556688.)

A. H. Bentley.—"Means for generating electrical current." 5457. April 23rd, 1942. (556597.)

British Thomson-Houston Co., Ltd.—"Tubular electric lamp-holders." 4651/42. April 9th, 1941. (556591.) "Chlorinated synthetic rubber." 17212/42. December 10th, 1941. (556684.) "Protective apparatus for alternating current circuits." 5512/42. April 28th, 1941. (556694.)

British Thomson-Houston Co., Ltd., H. E. Cox and C. J. E. Dixon.—"Liquid resistors." 4589. April 8th, 1942. (556611.)

Brush Electrical Engineering Co., Ltd., and A. Earls.—"Control of electric motors." 1866. February 12th, 1942. (556637.)

J. A. Crabtree & Co., Ltd., H. F. McLoughlin, W. E. Hill, R. W. Morgan and T. D. G. Wintle.—"Electric switches of the push-button type." 8802. June 26th, 1942. (556600.)

H. J. Finden and Plessey Co., Ltd.—"Means for generating oscillatory electric currents of precise frequencies." 3235. March 11th, 1942. (556641.)

General Electric Co., Ltd., and J. T. Caldwell.—"X-ray apparatus." 12947. September 14th, 1942. (556705.)

A. Graham & Co., Ltd., and C. H. Vaughan.—"Electromagnetic relays." 6093. May 6th, 1942. (556654.)

Kapella, Ltd., and R. E. Reason.—"Electrical measuring apparatus." 2963. March 6th, 1942. (556607.)

D. Karo, E. Armelin and Chambon, Ltd.—"Dimming devices for use with electric torches and the like." 6514. May 13th, 1942. (556628.)

Londex, Ltd., and W. L. Stern.—"Electrically operated devices for liquid level regulation or indication." 7793. June 8th, 1942. (556599.)

Marconi Instruments, Ltd., W. B. Bartley and C. F. Brockelsby.—"Apparatus for and methods of measuring or controlling the value of pH, or of conductivity of solutions, or of oxidation reduction potentials and the like." 4850. April 13th, 1942. (556649.)

J. F. O'Brien.—"Electricity conductor unit." 5609/42. April 26th, 1941. (556651.)

Philips Lamps, Ltd. (Naamlooze Vennootschap Philips' Gloeilampenfabrieken).—"Cathode-ray tube device for generating ultra-high-frequency oscillations." 14177. November 3rd, 1941. (556662.)

Polya Glove Factory, Ltd., P. Polya, E. Polya and L. Slack.—"Electric heating of clothing and the like." 5194. June 1st, 1942. (556594.)

M. A. Pritchard.—"Armchair constructed to permit warmth to be switched on throughout." 364. January 8th, 1943. (556685.)

A. Reyrolle & Co., Ltd., F. H. Groom and J. W. Lowes.—"Electric contact devices such as fuses, cut-outs and the like." 4703/4. April 10th, 1942. (556615/6.)

A. Reyrolle & Co., Ltd., W. W. Martin, J. A. Thomas and F. H. Groom.—"Electric fuse elements." 4735. April 10th, 1942. (556618.)

A. I. Rochmann.—"Electrically heated soldering irons." 3021. March 7th, 1942. (556609.)

H. Southey.—"Electric bed warmer adaptable for use as a reading or other lamp." 7780. June 8th, 1942. (556658.)

Standard Telephones & Cables, Ltd., and J. Handley.—"Electrical measuring instruments." 4745. April 10th, 1942. (556643.) "Electrical measuring instruments." 6341. May 11th, 1942. (556655.)

Standard Telephones & Cables, Ltd., and A. J. Maddock.—"Arrangements for eliminating unwanted signals in amplitude modulated electrical signal communication systems." 4695. April 9th, 1942. (556614.)

Standard Telephones & Cables, Ltd., A. Brown and T. A. Marshall.—"Railway signal and/or points control equipment." 15489. December 2nd, 1941. (556581.)

J. Stone & Co., Ltd., and A. H. Chilton.—"Plates for secondary batteries." 4737. April 10th, 1942. (556619.)

Westinghouse Brake & Signal Co., Ltd., and L. H. Peter.—"Control of current for electro-deposition." 3182. March 11th, 1942. (556640.)

Westinghouse Brake & Signal Co., Ltd., L. H. Peter and R. M. McGregor.—"Electric control of point-operating mechanism for railways and the like." 4657. April 9th, 1942. (556613.)

TRADE MARK APPLICATIONS

THE following applications have been made for British trade marks. Objections may be made within a month of October 27th.

NEVELIN. No. 621,522. Class 9. Mercury-arc electric current rectifiers or transformers, etc.—Nevelin Electric Co., Ltd., Purley Way, Croydon, Surrey. To be associated with No. 554,883 (2959) viii.

LUSTRAPHONE. No. 624,046. Class 9. Microphones, loud speakers, sound amplifiers, cinematograph instruments, etc.—Lustraphone, Ltd., 84, Belsize Lane, London, N.W.3.

TELEGHRON. No. 624,302. Class 9. Recording, indicating and controlling mechanism, all being time actuated.—British Vacuum Cleaner & Engineering Co., Ltd., Goblin Works, Ermyn Way, Leatherhead, Surrey.

CROW. No. 624,309. Class 9. Scientific instruments and electrical instruments (not included in other classes).—Electro Methods, Ltd., 112, Brent Street, Hendon, London, N.W.4.

BICOMET. No. 623,823. Class 16. Metal sheets for printing or engraving.—British Insulated Cables, Ltd., Prescot, Lancs.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Edinburgh.—November 18th. Corporation Electricity Department. Paper-insulated cables. Specification No. 189. Electrical Engineer's Office, Dewar Place.

Macclesfield.—November 17th. Electricity Department. 11-kV switchgear. (October 15th.)

Manchester.—November 5th. Electricity Department. 10,000-kVA transformer. (October 22nd.)

Wick.—November 22nd. Town Council. Electric lighting work in erection of fourteen blocks comprising 40 houses. Specifications from burgh surveyor (fee £2 2s.). Tenders to town clerk.

Orders Placed

Glasgow.—Transport Committee. Accepted. Coils for tram motors.—Metropolitan-Vickers Electrical Co.; English Electric Co. Asbestos-covered wire.—London Electric Wire Co. and Smiths.

Cleansing Committee. Accepted. Electric welding set for St. Rollox workshops (£86).—Quasi Arc Co.

Health Committee. Accepted. Installation of electrode boilers and circulators at Hawkhead Mental Hospital (£9,826).—Bastian & Allen.

Guildford.—Finance Committee. Recommended. Internal telephone system at municipal offices.—Dictograph Telephones.

Hastings.—Electricity Committee. Accepted. Cooling tower repairs (£1,468).—Premier Cooler & Engineering Co.

Manchester.—Water Committee. Accepted. Electrically driven pumps with switchgear, pipes, etc.—Sulzer Bros.

Middlesex.—Health Committee. Accepted. Electrical work at Stoke D'Abernon Institution (£52).—Page & Girling.

Warrington.—Electricity Committee. Accepted for twelve months. Cables.—B.I. Cables Earthenware conduits.—Albion Clay Co. Cable covers.—H. J. Baldwin & Co.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Ashford (Kent).—Erection of wartime nursery, Beaver Lane; surveyor, Urban Council offices.

Astley Bridge.—Works extensions and alterations; Phillipson & Co. (Bolton), Ltd.

Ayrshire.—Kitchens at Girvan, Maybole, Ayr, Muirkirk, Irvine and Ardrossan; county architect, Ayr.

Bolton.—Boiler house extension, Hartford Tannery, Weston Street; W. Walker & Sons, Ltd.

Cardiff.—A.R.P. garages (£4,248); city engineer.

Dumbarton.—Temporary houses, Vale of Leven and Old Kilpatrick; county architect, 18, Park Circus, Glasgow, C.3.

Durham.—Miners' canteens at Thrislington and Coxhoe; G. W. Lazenby & Sons, Ferryhill, near Darlington.

Fraserburgh.—Extension to water filter house and a new pump house; burgh surveyor, 51, Mid Street, Fraserburgh.

Gateshead. — Nursery, South Close Villa (£2,184); J. Clark and Son, builders, Seaham.

Sculleries at six schools; borough engineer, Municipal Buildings, Gateshead.

Greenock.—Reconstruction of Central Picture House after fire; manager.

Guildford.—Block of offices, Walnut Tree Close; R. Holford & Co.

Havant.—Restaurant at Waterlooville for U.D.C.; engineer, Engineer's Department, 1, Park Road, Havant.

Hendon.—School kitchens; borough engineer, Town Hall, Hendon, N.W.4.

Huntingdonshire. — Woodwork centre and adaptations for school meals accommodation, Fletton; county architect, Walden House, Huntingdon.

Jarrow. — School kitchen, Grant Street; borough engineer.

London.—DEPTFORD.—Nursery, Clyde Street; borough engineer.

Lostwithiel.—Fire station for N.F.S.; town clerk, Municipal Offices.

Luton.—New headquarters (£7,500); Luton Battalion, Boys' Brigade.

Manchester.—Mineral water factory; Mendel Lapidus, Mount Pleasant, Manchester, 8.

Middlesbrough.—Rebuilding of Leeds Hotel for North-Eastern Breweries; Kitching & Co., architects, 40, Albert Road, Middlesbrough.

Middlesex.—Maternity homes, Finchley and chest clinic, Harrow (£1,000); county architect.

North Shields.—Works additions, Low Lights; N. S. Fish & Guano Co., Ltd.

Store, Low Lights, for J. A. Whitelaw, Ltd.; Ogilvie & Sons.

Northumberland.—Farm workers' houses for the R.D.C.; J. W. Urpeth, builder, Bedlington (eight) and Mauchlen & Weightman, Saville Row, Newcastle-on-Tyne (eight).

Ossett.—Central kitchen, Croft House; borough engineer.

Salop.—Additional equipment at Technical College, Shrewsbury (£1,050); A. G. Chant, county architect, 5, Belmont, Shrewsbury.

Canteen kitchen at Junior School and additional accommodation at Technical Institute, Oswestry (£1,020) for Salop Education Committee; J. Barlow & Sons, builders, Gobowen Road, Oswestry.

South Shields.—Additions to maternity home at the General Hospital and adaptation of Manor House, Westoe, as technical school; acting borough engineer.

Stockport.—Works canteen; Barnshaw & Co., Ltd., Palmer Mills, Mersey Street.

Surrey.—School, Chessington (£8,000); county architect, County Hall, Kingston-on-Thames.

Tynemouth.—Youth centre (£8,000); borough engineer.

Warrington.—Works additions, Howley; J. Fairclough & Sons, Ltd.

Warwickshire.—Equipment of measurement room at Technical College, Rugby (£2,000); A. C. Bunch, county architect, Shire Hall, Warwick.

West Ham.—Extension of school canteens in twelve schools; borough engineer, Town Hall, E.15.

Wiltshire.—Erection of clinic, Corsham; T. Walker, county architect, County Hall, Trowbridge.

Wood Green.—Partial rebuilding of 83, Pellatt Grove; G. Groves & Son, Ltd.

Forthcoming Events

Institution of Electrical Engineers.—*Transmission Section.*—Wednesday, November 10th, 5.30 p.m. "Maintenance of Distribution Plant and Mains on AC Networks," by Messrs. F. N. Beaumont, B.Sc. (Eng.) and F. A. Geary.

Installations Section.—Thursday, November 11th, 5.30 p.m. "Emergency Lighting Systems and their Applications, with Particular Reference to Battery Equipments," by Mr. S. H. Chase.

Wireless Section.—Tuesday, November 16th, 5.30 p.m. Discussion on "The Role of Ultra-High Frequencies in Post-War Broadcasting," to be opened by Messrs. K. I. Jones and D. A. Bell, M.A., B.Sc.

North-Western Centre.—Saturday, November 6th, 2.30 p.m. Engineers' Club, Albert Square, Manchester. "The High-pressure Gas-filled Cable," by Messrs. C. J. Beaver and E. L. Davey, B.Sc. *Wireless Group.*—Friday, November 12th, 6 p.m. Engineers' Club. Informal discussion on "Magnetic Dust Cores."

North-Eastern Centre.—Monday, November 8th, 6.15 p.m. Neville Hall, Westgate Road, Newcastle-on-Tyne. "The Protection of Structures Against Lightning," by Mr. J. F. Shipley.

Western Centre.—Monday, November 8th. Bristol. "Brains Trust."

London Students' Section.—Tuesday, November 9th, 7 p.m. Chairman's address on "Remote Control of Traction Supplies," by Mr. J. D. McNeil, B.Sc. (Eng.).

South Midland Students' Section.—Tuesday, November 9th, 7 p.m. Association Hall, English Electric Co., Stafford. "Turbo-alternator Ventilation," by Mr. H. R. Ogle.

Bristol Students' Section.—Friday, November 12th. Bath. "Brains Trust."

Illuminating Engineering Society.—Tuesday, November 9th, 5 p.m. E.L.M.A. Lighting Service Bureau, 2, Savoy Hill, London, W.C.2. "The Lighting of Public Buildings," by Mr. W. T. F. Souter.

Association of Supervising Electrical Engineers.—*Birmingham and District Branch.*—Wednesday, November 10th, 7 p.m. Birmingham Chamber of Commerce, New Street. Paper: "Improved System of Electro-magnetic Crack Detection by the Designer," to be read by Mr. T. W. Wood.

Institution of Mechanical Engineers.—Friday, November 12th, 5.30 p.m. Storey's Gate, London, S.W.1. Symposium of papers on "Reclamation of Worn Parts," including metal spraying (Mr. W. E. Ballard), welding (Mr. W. Andrews, B.Met.), and electro-deposition (Mr. A. W. Hothersall, M.Sc.).

Institution of Civil Engineers.—*Railway Engineering Division.*—Tuesday, November 9th, 5 p.m. "Electrification of the Wirral Lines of the L.M.S. Railway," by Mr. C. E. Fairburn.

North East Coast Institution of Engineers and Shipbuilders.—*Student Section.*—Wednesday, November 10th, 6.45 p.m. Bolbec Hall, Newcastle-on-Tyne. "Superheating," by Mr. W. I. Miller.

Institute of Welding.—Wednesday, November 10th, 4 p.m. Institution of Civil Engineers, Great George Street, S.W.1. "Welding Applied to Trackwork on the L.M.S. Railway," by Dr. H. O'Neill and Mr. N. W. Swinnerton.

Junior Institution of Engineers.—Friday, November 12th, 6.30 p.m. 39, Victoria Street, London, S.W.1. Annual general meeting.

British Coal Utilisation Research Association.—Wednesday and Thursday, November 10th and 11th. Institution of Mechanical Engineers, Storey's Gate, London, S.W.1. Conference on "Problems in the Utilisation of Small Coals."

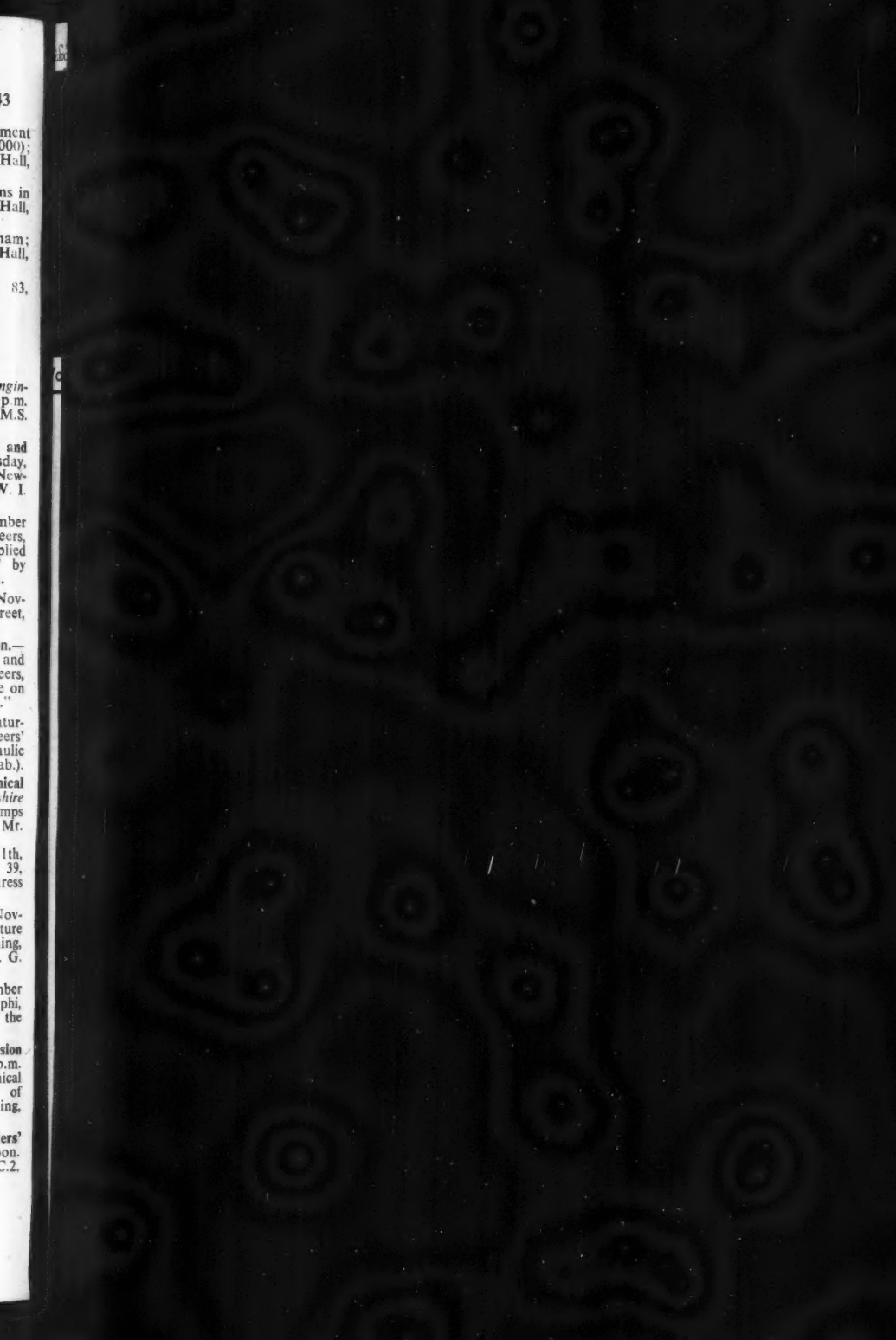
Manchester Association of Engineers.—Saturday, November 13th, 2.30 p.m. Engineers' Club, Albert Square. "Control of Hydraulic Power," by Mr. E. Bruce Ball, M.A. (Cantab.).

Association of Mining Electrical and Mechanical Engineers.—*West of Scotland and Ayrshire Branches.*—Saturday, November 13th. "Pumps and Pumping Problems" (illustrated), by Mr. W. Boyle.

London Branch.—Thursday, November 11th, 4.30 p.m. Junior Institution of Engineers, 39, Victoria Street, S.W.1. Presidential address by Mr. S. W. Richards.

Derby Society of Engineers.—Monday, November 15th, 6.30 p.m. School of Arts Lecture Theatre, Green Lane. "Post-War Planning, with Special Reference to Coal," by Mr. E. G. Phillips.

Royal Society of Arts.—Wednesday, November 17th, 1.45 p.m. John Adam Street, Adelphi, London, W.C.2. "The Coming of Age of the B.B.C.", by Mr. Stuart Hibberd.

North-East London Supervisors' Discussion Group.—Tuesday, November 9th, 7 p.m. (tea 6.30 p.m.). South-West Essex Technical College, Walthamstow. "Some Aspects of Industry in Russia," by Dr. A. P. M. Fleming, C.B.E.

Electrical Trades' Commercial Travellers' Association.—Friday, November 19th, noon. Clare House, 55, Kingsway, London, W.C.2. Annual general meeting.